Subject: PAG Documents
To: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Glenna Shields/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Tony Nesky/OU=DC/O=USEPA/C=US
Submit Time: 12/2/2010 21:40:42

Dear Lee, Sara, and Glenna,

Attached is a PDF file of the formatted Chapters 1-3, including a Table of Contents. Also attached is a "Blackberry" version of Chapter 1 in case Gina wants to read it while she travels. The "Blackberry" version is in Arial 12, with no footnotes. This format has been readable on Blackberries in my prior experience, BUT SOMEBODY PLEASE TEST IT ON A BLACKBERRY before forwarding it to Gina.

Lee and Glenna, I left a printed hard copy of the PAG document for you.

Tony Nesky
Center for Radiation Information and Outreach
Tel: 202-343-9597

nesky.tony@epa.gov**DraftPAGManual1210PDF.pdf** DraftPAGManual1210PDF.pdf **PAGCH1forBlackberry.doc** PAGCH1forBlackberry.doc

Protective Action Guidance for Radiological Incidents

Draft for Interagency Review
December 2010

This page intentionally left blank.

Waiver

This guidance is not intended to impact site cleanups occurring under other statutory authorities such as the United States Environmental Protection Agency's Superfund program, the Nuclear Regulatory Commission's decommissioning program, or other federal or state cleanup programs.

As indicated by the use of non-mandatory language such as "may," "should," and "can," this Manual only provides recommendations and does not confer any legal rights or impose any legally binding requirements upon any member of the public, states, or any other federal agency.

ED_001057C_T3_00046687

This page intentionally left blank.

ED_001057C_T3_00046687

Table of Contents

Chapter 1: OVERVIEW 1

1.1 Protective Actions and Protective Action Guides 1
1.2 Applicability 1
1.3 Background on the Updated PAGs 2
1.3.1 Legal Basis 2
1.3.2 Technical Basis 3
1.3.3 Changes in Scenarios since the Issuance of the 1992 PAG Manual 3
1.3.4 Key Changes to PAGs in this Updated Manual 3
1.4 Radiological Incident Phases and Applicability of Protective Actions 4
1.4.1 Early Phase Protective Action Guides and Protective Actions 5
1.4.2 Intermediate Phase Protective Action Guides and Protective Actions 6
1.4.3 Late Phase Standards 7
1.4.4. Initial Implementation of Protective Action Guides and Protective Actions 7
Key Points 8

Chapter 2: PROTECTIVE ACTION GUIES FOR THE EARLY PHASE 9

2.1 Introduction 9
2.2 Exposure Pathways during the Early Phase 9
2.2.1 The Establishment of Exposure Patterns 10
2.3 The Protective Action Guides and Protective Actions for the Early Phase: Evacuation, Sheltering-in-Place, and Administration of Potassium Iodide 10
2.3.1 Evacuation vs. Sheltering-in-Place 11
2.3.2 General Guidance for Evacuation and Sheltering-in-Place 12
2.3.3 Considerations for Evacuation 13
2.3.4 Considerations for Sheltering in Place 13
2.3.5 Thyroid Protection during the Early Phase 15
2.3.6 PAGs and Nuclear Facilities Emergency Planning Zones 16
2.4 Dose Projections 17
2.4.1 Dose Projection during the Early Phase 17
2.4.2 Duration of Exposure 17
2.5 Derived Response Levels and Dose Conversion Factors 18
2.6 Radiation Risks in Emergency Response and Planning for Implementation of the Protective Action Guides 19
2.7 Controlling Occupational Exposure and Doses to Emergency Responders 19
2.7.1 Maintaining the ''As Low As Reasonably Achievable'' Principle 20
2.7.2 Understanding Dose and Risk Relationships 20
2.7.3 Incident Commanders and Responders Need Proper Training in Advance 22
2.7.4 Occupational Safety and Health Act (OSHA) Standards and their State Equivalents 22
2.7.5 DOE Occupational Standards 22
2.7.6 NRC Occupational Standards 23
2.7.7 Contamination Limits and Monitoring of the Environment and Populations 23
Key Points 24

ED_001057C_T3_00046687

Chapter 3: PROTECTIVE ACTION GUIES FOR THE INTERMEDIATE PHASE 25
3.1 Introduction 25
3.2 Exposure Pathways during the Intermediate Phase 25
3.3 The Protective Action Guides and Protective Actions for the Intermediate Phase: Relocation and Dose Reduction 25
3.3.1 The Population Affected 27
3.3.2 Areas Involved 27
3.3.3 Priorities 28
3.4 Sequence of Events 28
3.4.1 Establishment of Isodose-Rate Lines 29
3.4.2 Dose Projection 29
3.4.3 Projected External Gamma Dose 30
3.5 Applying the Protective Action Guides for Relocation 31
3.5.1 Exposure Limits for Persons Reentering the Relocation Area 31
3.6 Surface Contamination Control 32
3.6.1 Priorities for Control of Contaminated Areas 32
3.7 Longer-Term Objectives of the Protective Action Guides for the Intermediate Phase 34
Key Points 34

ED_001057C_T3_00046687

Chapter 1
Overview

1.1 Protective Actions and Protective Action Guides

The U.S. Environmental Protection Agency (EPA) has developed this Manual to assist public officials in planning for emergency response to radiological incidents. This document defines a radiological incident as an event or a series of events, deliberate or accidental, leading to the release or potential release into the environment of radioactive materials in sufficient quantity to warrant consideration of protective actions. This Manual provides radiological protection criteria for application to incidents that would require consideration of protective actions, with the exception of nuclear war.

During an incident with an uncontrolled source of radiation, protection of the public from unnecessary exposure to radiation usually requires some form of intervention that will disrupt normal living. Such intervention is termed a protective action. Examples of protective actions include—

- evacuating an area
- sheltering-in-place within a building or protective structure
- administering potassium iodide (KI) as a supplemental action
- acquiring an alternate source of drinking water.

This Manual provides recommended numerical protective action guides (PAGs) for the principal protective actions available to public officials during a radiological incident. This document defines a protective action guide (PAG) as the projected dose to an individual from a release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. PAGs are guides to help officials select protective actions under emergency conditions during which exposures would occur for relatively short time periods. They are not meant to be applied as strict numeric criteria, but rather as guidelines to be considered in the context of incident-specific factors. PAGs do not establish an acceptable level of risk for normal, nonemergency conditions, nor do they represent the boundary between safe and unsafe conditions. The PAGs are not legally binding regulations or standards and do not supersede any environmental laws.

Some protective actions are not associated with a numerical PAG. For example, the control of access to areas is a protective action implemented in concert with other protective actions; it does not have its own PAG. Any reasonable action to reduce radiation dose is encouraged even if it is not associated with a PAG, such as recommending that individuals use *ad hoc* respiratory protection with a handkerchief or piece of folded cloth.

1.2 Applicability

Protective actions may be recommended for a wide range of incidents, but generally apply to incidents involving relatively significant releases of radionuclides. Radiological incidents with potential for significant releases include—

- a fire in a major facility such as a nuclear fuel manufacturing plant
- an accident at a federal weapons complex facility
- an accident at a commercial nuclear power plant
- a transportation accident involving radioactive material
- a terrorist act involving a radiological dispersion device (RDD) or yield-producing improvised nuclear device (IND).

ED_001057C_T3_00046687

Each type of incident would pose a unique threat to public health, and should be planned for and managed accordingly. Emergency response planning for a given facility or scenario should consider—

- the radionuclides involved
- the dynamics of the release
- feasibility of specific protective actions
- the timing of notification, response, and protective action implementation.

The decision to advise members of the public to take a protective action during a radiological incident involves a complex judgment in which the radiological risk must be weighed against the action's inherent risks. This decision may have to be made under emergency conditions, with limited information and little time to analyze options. Advance planning reduces the complexity of the decision-making process during an incident. The planning process can identify the viability of responses to various incidents, the courses of action that can be set in motion in advance, and the decisions that can only be made during an actual emergency.

The unpredictable locations of certain radiological incidents make advance planning challenging. For example, an RDD could detonate anywhere and spread radiological contaminants over a wide variety of surfaces and terrain. Emergency planners should be prepared to apply PAGs to a wide scope of facilities and circumstances.

1.3 Background on the Updated PAGs

These guides and recommendations update those found in the *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents* (EPA-400-R-92-001, May 1992), published by the United States Environmental Protection Agency (EPA 1992b) (hereinafter referred to as the "1992 PAG Manual"). This guidance was developed cooperatively with the Federal Radiological Preparedness Coordination Committee (FRPCC), with representation from the Environmental Protection Agency, the Department of Energy (DOE), the Department of Defense (DOD), the Federal Emergency Management Agency (FEMA), the Nuclear Regulatory Commission (NRC), the Department of Health and Human Services (HHS), including the Centers for Disease Control (CDC) and the Food and Drug Administration (FDA), the Department of Agriculture (USDA) and the Department of Labor (DOL).

1.3.1 Legal Basis

The historical and legal basis of EPA's role in this guidance begins with Reorganization Plan No. 3 of 1970, in which the Administrator of EPA assumed all the functions of the Federal Radiation Council (FRC), including the charge to "…advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States." (Reorg. Plan No. 3 of 1970, sec. 2(a) (7), 6(a) (2); Atomic Energy Act of 1946, as amended). Recognizing this role, FEMA directed EPA in their Radiological Emergency Planning and Preparedness Regulations to "establish Protective Action Guides (PAGs) for all aspects of radiological emergency planning in coordination with appropriate Federal agencies." (44 CFR §351.22(a)). FEMA also tasked EPA with preparing "guidance for State and local governments on implementing PAGs, including recommendations on protective actions which can be taken to mitigate the potential radiation dose to the population (44 CFR §351.22(b)). All of this information was to "be presented in the Environmental Protection Agency (EPA) 'Manual of Protective Action Guides and Protective Actions for Nuclear Incidents.' (44 CFR §351.22(b)).

Additionally, section 2021(h) of the Atomic Energy Act Reorg. Plan No. 3 charged the Administrator with performing "such other functions as the President may assign to him [or her] by Executive order." Executive Order 12656 states that the Administrator shall "[d]evelop, for national security emergencies, guidance on acceptable emergency levels of nuclear radiation…." (Executive Order No. 12656, sec.1601(2)). EPA's role in the development of PAGs was also recognized in the *National Response Framework, Nuclear/Radiological Incident Annex* of June 2008.

ED_001057C_T3_00046687

1.3.2 Technical Basis

The FRC introduced the concept of a PAG in a series of recommendations issued in the 1960s. A key concept about PAGs is that the decision to implement protective actions should be based on the projected dose that would be received if the protective actions were not implemented. Developers of the EPA PAGs considered the following three principles in establishing exposure levels for the PAGs—

1. Prevent acute effects.
2. Balance protection with other important factors and ensure that actions result in more benefit than harm.
3. Reduce risk of chronic effects.

These principles apply to the determination of any PAG. Principles 1 and 2 have been proposed for use by the international community as essential bases for decisions to intervene during an incident. Principle 3 has been recognized as an appropriate additional consideration (IAEA 1989). Although it is important during emergency planning to consider a range of source terms to assess the costs associated with their implementation, the PAGs are pre-determined for use in emergencies without regard to the magnitude or type of radiological release.

1.3.3 Changes in Scenarios since the Issuance of the 1992 PAG Manual

EPA's 1992 PAG Manual provided emergency management officials at the federal, state, tribal and local levels with the technical basis to plan responses to radiological emergencies. The 1992 PAG Manual was written to accommodate the worst release scenario deemed likely at the time – a major accident at a commercial nuclear power plant that would result in a significant offsite release of radioactive material. ("Site" and "offsite" in this Manual refer to locations where the radiological incident occurs and are not limited to facility-type incidents.) Certain characteristics typify nuclear power plants, including—fixed locations at which an accident might occur; a known suite of radionuclides on site that are dominated by short-lived radioisotopes; tight regulatory controls and requirements; skilled operational personnel who plan for and exercise emergency responses; state and local involvement in emergency planning; well-developed and zoned emergency evacuation plans and routes; and advance notice (generally hours to days) from deteriorating plant conditions prior to accidental release of radioactive material into the environment. Therefore, the 1992 PAG Manual provided decision-makers with radiation dose-based PAG values various exposure pathways (such as whole body, skin dose, and food ingestion), and associated protective actions that were adapted to the mix of radionuclides and operational environments associated with commercial nuclear power plants.

In late 1992, EPA conducted a symposium titled "Implementing Protective Actions for Radiological Incidents at Other Than Nuclear Power Reactors," to evaluate PAGs for incidents other than accidents at nuclear power plants and concluded that the PAGs could be applied to all radiological incidents (EPA 1992a). Since then, new radiological and nuclear scenarios involving terrorist use of a radiological dispersion device (RDD) or an improvised nuclear device (IND) have gained status in radiological emergency response planning. An RDD is a device or mechanism that is intended to spread radioactive material from the detonation of conventional explosives or other means. An IND is a crude, yield-producing nuclear weapon fabricated from diverted fissile material. Incidents like these may occur anywhere with little or no warning.

1.3.4 Key Changes to PAGs in this Updated Manual

This updated Manual applies PAGs and protective actions to an expanded range of sources of potential radiological releases, including commercial nuclear power facilities, uranium fuel cycle facilities, nuclear weapons facilities, transportation accidents, radiopharmaceutical manufacturers and users, space vehicle launch and reentry, RDDs, and INDs.

ED_001057C_T3_00046687

Dosimetry for all the PAGs was updated using the International Commission on Radiological Protection (ICRP) Publication 60 series (ICRP 1991a). The PAGs in this Manual are based on the calculations and tables contained in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manual (DOE 2010).[1]

This update also lowers the recommended dose for administration of potassium iodide (KI) to children. FDA adopted this lower dose in 2001 based on studies of Chernobyl exposure data (FDA 2001 and FDA 2002).

The 1992 PAG Manual included placeholders anticipating the development of a drinking water PAG and cleanup guidance, but they are not included this update. Because EPA has established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act, the Agency defers to these standards to make decisions about protective actions for drinking water. EPA has not included late phase cleanup guidance in this Manual because it is outside the scope of the emergency response focus of this Manual, and existing state and federal cleanup programs are available for designing and implementing long-term cleanup following a radiological emergency (e.g., the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), which is implemented consistent with the National Contingency Plan and extensive EPA guidance). [2]

1.4 Radiological Incident Phases and Applicability of Protective Actions

Emergency planners typically divide responses to radiological incidents into three time phases—

- **Early Phase**—The period beginning at the projected (or actual) initiation of a release and extending to a few days later, when deposition of airborne materials has ceased and sufficient information has become available to permit decisions about additional or longer term protection. This phase may last from hours to days.

- **Intermediate Phase**—The period beginning after the source and releases have been brought under control and environmental measurements are available for use as a basis for decisions on protective actions and extending until these protective actions are terminated. This phase may overlap the early phase and late phase and may last from weeks to months.

- **Late Phase**—The period beginning when recovery actions designed to reduce radiation levels in the environment to acceptable levels are commenced, and ending when all recovery actions have been completed. This phase may extend from months to years.

The phases cannot be represented by precise periods of time – and may even overlap – but can provide a useful framework for emergency response planning.

EPA PAGs and their associated protective actions are applicable for both the early and intermediate phases. The PAGs in this Manual apply to emergency responses and are not intended for late phase remediation and environmental restoration activities.

Sheltering-in-place and evacuation are the principal protective actions in the early phase. These actions are meant to avoid inhalation of gases or particulates in an atmospheric plume. Administration of prophylactic drugs may be employed depending on the specific radionuclides released; in particular, potassium iodide (KI)—also called "stable iodine"—may be administered as a supplementary protective action in incidents involving the release of radioactive iodine, such as nuclear power plant incidents. Some protective actions may begin prior to release of radioactive material when there is advance notice.

Table A presents PAGs with their principal associated protective actions. In 2001, the PAG for administration of stable iodine was changed to 5 rem (50 millisieverts (mSv)) dose to child thyroid. It is assumed that recovery

---

[1] See: http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL1.pdf
http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL2.pdf

[2] Please note that the DHS/FEMA 2008 document, *Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents,* contains DHS/FEMA's recommended drinking water PAG and late phase cleanup guidance for use in RDD/IND situations; the DHS PAG and guidance are not part of EPA's 2010 PAG Manual recommendations and are not adopted herein.

ED_001057C_T3_00046687

operations will have commenced within this period of time. All other PAGs and corresponding protective actions from the 1992 PAG Manual remain unchanged.

Recommended limits of exposure for emergency workers also remain unchanged from the 1992 PAG Manual. The OSHA annual limit for radiation dose is 5 rem (50 mSv). Responsible officials should use judgment when doses may exceed OSHA annual limits and must advise workers of the risks involved when doses approach 25 rem (250 mSv). There is no recommended dose limit for emergency workers performing life-saving activities. Further discussion of worker dose guidelines can be found in Chapter 2.

Table A. Protective Action Guides for Radiological Incidents

Phase	Protective Action Recommendation	Protective Action Guide
Early	Sheltering-in-place or evacuation of the public[a]	1 to 5 rem projected dose/4 days[b]
	Administration of prophylactic drugs - potassium iodide[c]	5 rem projected dose to child thyroid[d]
	Limit emergency worker exposure	5 rem/year (or greater under exceptional circumstances)[e]
Intermediate	Relocation of the public	2 rem projected dose first year[b] Subsequent years, 0.5rem/y projected dose Cumulative dose over 50 years, 5 rem
	Food interdiction[f]	0.5 rem/year projected dose, or 5 rem/year to any individual organ or tissue, whichever is limiting
	Limit emergency worker exposure	5 rem/year[b]

[a]Should normally begin at 1 rem; take whichever action (or combination of actions) that results in the lowest exposure for the majority of the population. Sheltering may begin at lower levels if advantageous.
[b]Total Effective Dose Equivalent (TEDE) - the projected sum of the effective dose equivalent from external radiation exposure (i.e., groundshine) and the committed effective dose equivalent from inhaled radioactive material.
[c]Provides thyroid protection from radioactive iodines only. For other information on radiological prophylactics and treatment, refer to www.fda.gov/cder/drugprepare/default.htm, www.bt.cdc.gov/radiation, or www.orau.gov/reacts.
[d]Committed Dose Equivalent (CDE). FDA understands that a KI administration program that sets different projected thyroid radioactive exposure thresholds for treatment of different population groups may be logistically impractical to implement during a radiological emergency. If emergency planners reach this conclusion, FDA recommends that KI be administered to both children and adults at the lowest intervention threshold (i.e., > 5 rem (50 mSv) projected internal thyroid exposure in children) (FDA 2001).
[e]In cases when radiation control options are not available, or, due to the magnitude of the incident, are not sufficient, doses to emergency workers above 5 rem (50 mSv) may be unavoidable and are generally approved by competent authority. For further discussion see Chapter 2, Section 2.7.4.
[f] For more information on food and animal feeds guidance, the complete FDA guidance may be found at http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM094513.pdf

1.4.1 Early Phase Protective Action Guides and Protective Actions

In the early phase, there are little or no data on actual releases to the environment, and responders may have to rely on crude estimates of airborne releases. Decision time frames are short and preparation is critical to make prudent decisions when data are lacking or insufficient.

The principal protective actions for the early phase are evacuation and sheltering-in-place. These protective actions would be taken at projected doses of 1 to 5 rem (10 to 50 mSv) TEDE over four days.[3] The decision to evacuate must weigh the anticipated radiation dose to individuals in the affected population against the feasibility of evacuating within a determined time frame. For example, evacuating a population of 50,000 carries with it a statistical risk of injury or death from transportation hazards. Evacuation also takes time. In the case of an accident at a nuclear power plant, there may be sufficient time for an orderly and relatively safe evacuation. In the case of a fire or explosion of an RDD in an urban area, evacuating a large group of people could leave them exposed to the plume and actually increase radiation dose. Sheltering-in-place may be warranted in situations where evacuation poses a greater risk of exposure or physical harm.

[3] Total Effective Dose Equivalent (TEDE) – the sum of effective dose equivalent from external radiation exposure and the committed effective dose equivalent from inhaled and ingested radioactive material.

ED_001057C_T3_00046687

In addition, there are actions that are advisable, but not associated with a numerical PAG. For example, individuals should be instructed to cover airways (nose and mouth) with available filtering material when airborne radionuclides may be present. Decontamination is another protective action that may be utilized in the early phase and may include washing of contaminated individuals, removing contaminated clothing and decontaminating surfaces of critical areas and objects.

In cases where radioiodine may have been released, administration of the radioprotectant KI as a supplementary protective action should be considered if the committed dose equivalent exceeds 5 rem (50 mSv) to the child thyroid. This PAG is lower than the 1992 guidance. The lower dose, which FDA adopted in 2001, is for protection of children based on studies of Chernobyl exposure data.

The choice of protective action will be based on the status of the incident site and the prognosis for worsening conditions. In the early phase, precautionary actions based on worst-case scenarios may be used before implementation of protective actions based on PAGs. For example, in the case of RDD detonation, governments may instruct affected populations to shelter in place as a precautionary action while radiation levels are being measured to determine appropriate PAG-based protective actions. Officials should plan for rapid broadcast and dissemination of protective action orders to the public.

When available, predictions of radiological conditions in the environment based on an estimate of the source or actual environmental measurements may be used. Nuclear facilities, for example, have continuous, real-time radioactive effluent monitoring capabilities to monitor radioactive material released to the environment, and may have a network of offsite measurement stations.

1.4.2 Intermediate Phase Protective Action Guides and Protective Actions

Intermediate phase activities are intended to reduce or avoid dose to the public, to control worker exposures, to control the spread of radioactive contamination and to prepare for long-term cleanup operations.

During the intermediate phase, relocation, targeted environmental decontamination and focused cleanup are the principal protective actions against whole body external exposure from deposited material and from inhalation of radioactive particulate materials.

It is necessary to distinguish between evacuation and relocation. Evacuation is the urgent removal of people from an area to avoid or reduce high-level, short-term exposure, usually from the plume or deposited activity. Relocation is the removal or continued exclusion of people (households) from contaminated areas to avoid chronic radiation exposure. Site-specific conditions may allow some groups evacuated in an emergency to return, while others may have to relocate. In other cases, some groups that were not previously evacuated may have to relocate.

Intermediate phase PAGs are based on doses projected in the first and subsequent years. The PAG for relocation of the public is 2 rem (20 mSv) in the first year, 0.5 rem (5 mSv) in any subsequent year, with cumulative dose over 50 years (including the first and second years) not exceeding 5 rem. (Note: This intermediate phase dose does not include ingestion of food and water). When projected doses are less than 2 rem, focused environmental decontamination and cleanup can reduce doses to populations that are not relocated. Decontamination and focused cleanup techniques can range from simple actions such as the scrubbing and flushing of surfaces to the removal and disposal of soil and contaminated debris.

Keeping below the 0.5 rem (5 mSv) PAG for out years – the second year and beyond – may be achieved through the decay of shorter half-life radioisotopes (as in the case of an accident at a nuclear power plant), through environmental decontamination and cleanup efforts or through other means of controlling public exposures, such as limiting access to certain areas. In the case of an RDD, in which a longer half-life radioisotope would likely be used, reductions in dose may prove difficult to achieve without full-scale site restoration. If projected cumulative dose over 50 years may exceed 5 rem, relocation should be considered.

ED_001057C_T3_00046687

Finally, during the intermediate phase, government officials may convene to discuss long-term cleanup and site restoration strategies. All actions taken during the early and intermediate phases should be considered with respect to the impact they may have on long-term remediation, such as avoiding the use of fixatives that could hinder surface decontamination at a later date.

1.4.3 Late Phase Standards

The late phase is the period beginning when recovery actions designed to reduce radiation levels in the environment to acceptable levels are commenced, and ending when all recovery actions have been completed. This phase ends upon completion of all recovery actions, and may extend from months to years. PAGs are not appropriate for the late phase, because existing state and federal cleanup programs are available for designing and implementing long-term cleanup.

1.4.4. Initial Implementation of Protective Action Guides and Protective Actions

Immediately upon becoming aware that an incident has occurred that may result in exposure of the population, responsible authorities should make a preliminary evaluation to determine the nature and potential magnitude of the incident. This evaluation should determine whether conditions indicate a significant possibility of a major release and, to the extent feasible, determine potential exposure pathways, populations at risk and projected doses. The incident evaluation and recommendations should then be presented to emergency response authorities for consideration and implementation.

The sequence of events during the early phase includes evaluation of conditions at the location of the incident, notification of responsible authorities, prediction or evaluation of potential consequences to the general public, recommendations for action and implementation of actions for the protection of the public.

In the intermediate phase, dose projections used to support protective actions decisions may be based on measurements of environmental radioactivity and dose models. When conditions warrant relocation of populations, the collection of extensive radiological and cost-of-cleanup data will be necessary to form the decision basis for recovery of the affected areas.

Protective actions may be already designated in existing emergency response plans. Under NRC regulations, commercial nuclear power plants must maintain detailed radiological response plans for an emergency planning zone (EPZ) within a 10 mile (16.1 km) radius of the plant and for a separate ingestion pathway EPZ within a 50 mile (80.5 km) radius. Emergency responders should be prepared to select and implement appropriate protective actions when standing response plans are not available or applicable.

ED_001057C_T3_00046687

KEY POINTS IN CHAPTER 1

- A protective action guide (PAG) is the projected dose to an individual from a release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. PAGs are guides to help officials select protective actions under emergency conditions during which exposures would occur for relatively short time periods.
- EPA provides the Protective Action Guide (PAG) Manual to assist public officials with their radiological emergency response planning activities. The PAG Manual is a guidance document, not a legally binding regulation, and does not supersede any environmental laws. The PAG recommendations do not represent the boundary between safe and unsafe conditions.
- EPA issues PAGs under the authority granted it under the Reorganization Plan No. 3 of 1970, the Atomic Energy Act of 1946, as amended, and Executive Order 12656. The National Response Framework, Nuclear/Radiological Incident Annex of June 2008 also recognizes EPA's role in the development of PAGs.
- PAGs may be implemented to protect the public in a wide variety of radiological emergencies, including nuclear power plant accidents, transportation and space program accidents, and terrorist incidents.
- PAGs are appropriate for implementation in the early and intermediate phases of radiological incidents. The early phase—lasting days—is the period beginning at the projected (or actual) initiation of a release and ending when deposition of airborne materials has ceased. Little environmental data may be available in the early phase. The intermediate phase—lasting weeks to months—is the period beginning after the source and releases have been brought under control and environmental measurements are available for use as a basis for decisions on protective actions.

- *What's new in this updated Manual—*
    - Dosimetry for all the PAGs has been updated using the International Commission on Radiological Protection (ICRP) Publication 60 series (ICRP 1991a). The PAGs in this Manual are implemented using the calculations and tables in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manual.
    - EPA has lowered the recommended dose for administration of potassium iodide (KI) as a supplementary protective action based on the FDA guidance issued in 2001, and adopted by DHS/FEMA in 2008.
    - EPA recommends that protective actions for drinking water be based on established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act (SDWA).
    - EPA refers public officials to available state and federal cleanup programs (e.g., CERCLA) for designing and implementing long-term cleanup following a radiological emergency.

ED_001057C_T3_00046687

Chapter 2
Protective Action Guides for the Early Phase

2.1 Introduction

Decisions regarding protective actions for workers and the public during radiological incidents are risk management decisions and the recommendations in this Manual are provided in that context. Rapid action may be required to protect members of the public in the event of an incident involving a large release of radioactive materials into the environment. In all cases, all practical and reasonable means should be used to reduce or eliminate exposures.

This chapter presents protective action guides (PAGs) for use in the early phase of radiological incident. A PAG is the projected dose to an individual from a release of radioactive material at which a specific protective action should be taken to reduce or avoid that dose. The early phase begins at the actual or projected start of a release—before ambient environmental and radiological data become available for quantitative risk-based actions. The exact duration of the early phase depends upon site conditions, but one should plan to project doses for four days.

Many radiological emergency scenarios would involve airborne releases, so this chapter provides guidance for estimating projected doses from exposure to an airborne plume of radioactive material and for implementing protective actions. To implement the PAGs, dose calculations using dose conversion factors (DCFs) and derived response levels (DRLs) are available in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals (DOE 2010)[4].

2.2 Exposure Pathways during the Early Phase

During the early phase of an incident, there are three main exposure pathways from airborne releases—

- **Direct exposure** to radioactive materials suspended in an atmospheric plume. The contents of such a plume will depend on the source of radiation involved and conditions of the incident. For example, in the case of an incident at a nuclear power plant, the plume may contain radioactive noble gases, radioiodines and radioactive particulate materials. Many of these materials emit gamma radiation that can expose people in the vicinity of the passing plume.
- **Inhalation** of radionuclides from direct immersion in a radioactive atmospheric plume. Inhaled radioactive particulates, depending on their solubility in body fluids, may remain in the lungs or move via the bloodstream to other organs, prior to elimination from the body. Some radionuclides become concentrated in a single body organ, with only small amounts going to other organs. For example, a significant fraction of inhaled radioiodines will move through the bloodstream to the thyroid gland.
- **Deposition** of radioiodine and particulates from a radioactive plume. Deposited materials can continue to emit to beta and gamma radiation as "groundshine" after the plume has passed. Skin and clothes may become contaminated, resulting in exposure to skin and internal body organs.

Exposure pathways that contribute less than ten percent to the total dose incurred need not be considered during the early phase.

A plume may deposit materials on surfaces, posing a risk of longer-term exposures via ingestion, direct external exposure, and inhalation pathways. If the release contains large quantities of radioiodines or gamma-emitting particles, the resulting long-term exposure to this "groundshine" can be more significant than external exposure from immersion in the passing plume. Determination of doses from groundshine requires data that are usually not available during the early phase. Doses for groundshine can be calculated during the intermediate phase. (See Chapter 3.)

[4] See: http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL1.pdf
http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL2.pdf

ED_001057C_T3_00046687

2.2.1 The Establishment of Exposure Patterns

It is unlikely that sufficient environmental data will be available for accurate dose projections during and immediately following the early response to a radiological incident. Dose projections are needed to determine whether protective actions should be implemented in additional areas during the early phase.

There are two sources of data for dose projections in the early phase: current data from initial environmental measurements or estimates of the source term and estimated data using modeled or historical atmospheric transport data. Source term measurements, or exposure rates or concentrations measured in the plume at a few selected locations, may be used to estimate the extent of the exposed area in a variety of ways, depending on the types of data and computation methods available. The most accurate method of projecting doses is through the use of an atmospheric diffusion and transport model that has been verified for use at the site in question or for similar site conditions. A variety of computer software can be used to estimate exposures in real time, or to extrapolate a series of previously-prepared isopleths for unit releases under various meteorological conditions. The latter can be adjusted for the estimated source magnitude or environmental measurements at a few locations during the incident. If the model projections have some semblance of consistency with environmental measurements, extrapolation to other distances and areas can be made with greater confidence. If projections using a sophisticated site-specific model are not available, a simple but crude method is to measure the plume centerline exposure rate[5] at ground level (measured at approximately 1 m height) at a known distance downwind of the release point and to calculate exposure rates at other downwind locations by assuming that the plume centerline exposure rate is a known function of the distance from the release point.

The following relationship can be used for this calculation:

$$D_2 = D_1 (R_1/R_2)^y$$

where D_1 and D_2 are exposure rates at the centerline of the plume at distances R_1 and R_2 from the release, respectively, and y is a constant that depends on atmospheric stability. For stability classes[6] A and B, y = 2; for stability classes C and D, y = 1.5; and for stability classes E and F, y = 1. Classes A and B (unstable) occur with light winds and strong sunlight and classes E and F (stable) with light winds at night. Classes C and D generally occur with winds stronger than about 10 mph. This method of extrapolation is risky because the measurements available at the reference distance may be unrepresentative, especially if the plume is aloft and has a looping behavior. In the case of an elevated plume, the ground level concentration increases with distance from the source, and then decreases, whereas any high-energy gamma radiation from the overhead cloud continuously decreases with distance. For these reasons, this method of extrapolation will perform best for surface releases or if the point of measurement for an elevated release is sufficiently distant (usually more than 1 mile) from the point of release for the plume to have expanded to ground level. The accuracy of this method will be improved by the use of measurements from many locations averaged over time.

2.3 The Protective Action Guides and Protective Actions for the Early Phase: Evacuation, Sheltering-in-Place, and Administration of Potassium Iodide

The principal protective actions for the early phase are evacuation or sheltering-in-place. Evacuation is the movement of individuals away from the path of the plume. Sheltering-in-place refers to the use of a readily available structure that will provide protection from exposure to the plume. The administration of potassium iodide (stable iodine) to partially block the uptake of radioiodines by the thyroid is a supplemental protective action.

In addition, washing the body and changing clothing as soon as possible after significant exposure to a radioactive plume of any composition are always recommended protective actions. Changing of clothing is recommended primarily to provide protection from beta radiation from radioiodines and particulate materials deposited on the skin or clothing.

---

[5] The centerline exposure rate can be determined by traversing the plume at a point sufficiently far downwind that it has stabilized (usually more than one mile from the release point) while taking continuous exposure rate measurements.

[6] Pasquill stability classes categorize atmospheric turbulence into six stability classes named A, B, C, D, E and F, with class A being the most unstable or most turbulent class, and class F the most stable or least turbulent class. Pasquill, F. 1961. The Estimation of the Dispersion of Windborne Material. *The Meteorological Magazine* 90, No. 1063, 33-49.

ED_001057C_T3_00046687

The PAGs and corresponding protective actions for response during the early phase of an incident are summarized in Table 2-1. The basis for the PAGs for the early phase is given in Appendix C of the 1992 PAG Manual.[7] Evacuation or sheltering-in-place will usually be justified when the projected dose to an individual is 1 rem (10 mSv) projected over four days. This conclusion is based primarily on EPA's determination concerning acceptable levels of risk of health effects from radiation exposure in an emergency situation.

Table 2-1. PAGs and Protective Actions for the Early Phase of a Radiological Incident

Protective Action Response	PAG (projected dose)	Comments
Sheltering-in-place or evacuation of the public[a]	1 to 5 rem[b]	Evacuation (or, for some situations, sheltering-in-place[a])should normally be initiated at 1 rem.
Supplementary administration of prophylactic drugs – KI[c,d]	5 rem projected dose to child thyroid[e]	May require approval of state medical officials (or in accordance with established emergency plans)

[a]Should normally begin at 1 rem; take whichever action (or combination of actions) that results in the lowest exposure for the majority of the population. Sheltering may begin at lower levels if advantageous.
[b]Total Effective Dose Equivalent (TEDE) is the projected sum of the effective dose equivalent from external radiation exposure (i.e.,groundshine) and the committed effective dose equivalent from inhaled radioactive material.
[c]Provides thyroid protection from radioactive iodines only.
[d]For other information on radiological prophylactics and treatment, refer to www.fda.gov/cder/drugprepare/default.htm, www.bt.cdc.gov/radiation or www.orau.gov/reacts.
[e]Committed dose equivalent (CDE) (See Section 2.3.5).

2.3.1 Evacuation vs. Sheltering-in-Place

Evacuation and sheltering-in-place provide different levels of dose reduction from the principal exposure pathways: direct gamma exposure and inhalation. Evacuation, if completed before plume arrival, can be 100 percent effective in avoiding radiation exposure. The effectiveness of evacuation will depend on many factors, such as how rapidly it can be implemented and the nature of the incident. For incidents where the principal source of dose is inhalation, evacuation could increase exposure if it is implemented during the passage of a short-term plume, since vehicles used to transport evacuees provide little protection against exposure (DOE 1990). Evacuation will seldom be justified at less than 1 rem (10 mSv) over the first four days.

Evacuation can be 100 percent effective in avoiding dose if completed before plume arrival. Evacuation is appropriate when its risks and secondary effects are less severe than the risk of the projected radiation dose.

Sheltering-in-place is a low-cost, low-risk protective action that can provide protection with an efficiency ranging from zero to almost 100 percent, depending on the type of release, the shelter available, the duration of the plume passage, and climatic conditions. Because of these advantages, planners and decision makers may consider implementing sheltering-in-place when projected doses are below 1 rem (10 mSv) over the first four days.

Sheltering-in-place may be more effective against inhalation of radioactive particulates than against external gamma exposure, especially for short-term plumes. Sheltering-in-place may be the preferred alternative for higher risk groups (e.g., those who are not readily mobile) as a protective action at projected doses of up to 5 rem (50 mSv) over four days. When environmental, physical, or weather hazards impede evacuation, sheltering-in-place may be justified at projected doses up to 5 rem (50 mSv) to the general population (and up to 10 rem (100 mSv) for higher risk groups). It is also comparatively easy to communicate with populations that have sheltered-in-place.

[7] The 1992 PAG Manual is available as a historical reference on line at: www.epa.gov/radiation/rert/pags.html

ED_001057C_T3_00046687

Selection of either evacuation or sheltering-in-place is far from an exact science, particularly in light of time constraints that may prevent thorough analysis at the time of an incident. The selection process should be based on realistic or "best estimate" dose models and should take into account the unavoidable dose incurred during evacuation and potential failure scenarios for sheltering-in-place (e.g., a leaking ventilation system).

Sheltering-in-place should be preferred to evacuation whenever it provides equal or greater protection. Sheltering-in-place is usually not appropriate for areas where high doses are projected or for exposure lasting longer than two complete air exchanges of the shelter.

Advance planning and exercises can facilitate the decision process. In a nuclear power plant incident, early decisions should be based on information from the response plans for the Emergency Planning Zone (EPZ) and on real-time conditions at the nuclear facility (See Section 2.3.6). For transportation accidents, radiological dispersal devices (RDDs), improvised nuclear devices (INDs), and other incident scenarios for which EPZs are not practicable, best estimates of dose projections should be used for decisions between evacuation and sheltering-in-place. Studies have been conducted to evaluate sheltering-in-place (EPA 1978a) and evacuation (NRC 2005) as protective actions for incidents at nuclear power facilities. Reference EPA 1978b provides a method to evaluate the choice of sheltering in place, evacuation, or a sequence of both. The method requires collection of planning information before an incident and actual environmental and radiological data from the incident itself.

In general, sheltering-in-place is preferred to evacuation whenever it provides equal or greater protection. Sheltering-in-place is not a preferred protective action at projected doses greater than 10 rem (100 mSv) or for exposure lasting longer than two complete air exchanges of the shelter (EPA 1978a).

2.3.2 General Guidance for Evacuation and Sheltering-in-Place

The following is a summary of planning guidance for evacuation and sheltering-in-place—

- Evacuation may be the only effective protective action close to the plume source.
- Evacuation will provide total protection from any airborne release if it is completed before arrival of the plume.
- Evacuation may increase exposure if carried out during the plume passage.
- Evacuation is also appropriate for protection from groundshine in areas with high exposure rates from deposited materials when suitable shelter is not available.
- Sheltering-in-place may be appropriate (when available) for areas not designated for immediate evacuation because—
    - it may provide protection equal to or greater than evacuation for rapidly developing releases (e.g., RDDs) if followed by evacuation
    - it positions the public to receive additional instructions.
- Sheltering-in-place is usually not appropriate for areas where high doses are projected or for exposure lasting longer than two complete air exchanges of the shelter.
- Since it may be implemented rapidly, sheltering-in-place may be the protective action of choice if rapid evacuation is impeded by—
    - severe environmental conditions, e.g., severe weather or floods
    - health constraints, e.g., patients and workers in hospitals and nursing homes
    - long mobilization times that may be associated with certain individuals, such as industrial and farm workers, or prisoners and guards
    - physical constraints to evacuation, e.g., inadequate roads.
- If a major release of radioiodine or particulate materials occurs, inhalation dose may be the controlling criterion for protective actions. In this case—
    - breathing air filtered through common household items (e.g., folded handkerchiefs or towels) may be of significant help
    - after confirmation that the plume has passed, sheltering-in-place is no longer effective and may be harmful. Shelters should be opened to avoid airborne activity trapped inside, and persons should leave high exposure areas as soon as possible after cloud passage to avoid exposure to deposited radioactive material.

ED_001057C_T3_00046687

2.3.3 Considerations for Evacuation

Advance planning is essential to identify potential problems that may occur in an evacuation (Hans et al. 1975). An NRC case study cites the following aspects of planning as contributing to efficiency and effectiveness of evacuation (NRC 2005)—

- high level of cooperation among agencies
- use of multiple forms of emergency communications
- community familiarity with alerting methods, the nature of the hazard, and evacuation procedures
- community communication
- well-trained emergency responders.

The NRC 2005 study included an evaluation of 50 incidents of public evacuation involving 1,000 or more people. The evacuations studied were initiated in response to natural disasters, technological hazards, and malevolent acts occurring between January 1, 1990 and June 30, 2003. The report indicated that public familiarity with alerting methods and door to door notification were statistically significant factors for the efficiency of evacuation. The report also indicated that many communities are making improvements to response capabilities by modernizing communication systems, improving traffic flow, local education awareness, and developing interagency and cross-boundary coordination plans.

Large or small population groups can be evacuated effectively with minimal risk of injury or death. In the NRC report, only six of the 50 cases studied involved deaths from the hazard, and of those six, only one case involved death from the evacuation itself (NRC 2005).

The risk of injury or death to individual evacuees from transportation does not change as a function of the number of persons evacuated and can be conservatively estimated using National Highway Safety Council (NHSC) statistics for motor vehicle accidents (DOT 2004). Furthermore, only four of the 50 evacuation cases in the NRC study reported traffic accidents during evacuation (NRC 2005).

The emergency planning process for radiological incidents should include provisions for evacuation of special needs populations, such as children in schools and child care facilities, people in institutions, and people who have impaired mobility or lack personal transportation.

Evacuation costs are highly location-dependent and usually will not be a deterrent to implementation (Hans et al. 1975).

2.3.4 Considerations for Sheltering in Place

The degree of protection provided by structures is governed by attenuation of gamma radiation by structural components (the mass of walls, ceilings, etc.) and by outside/inside air exchange rates. (See Figure 2-1.) The use of large structures, such as shopping centers, schools, churches, and commercial buildings, as collection points during evacuation mobilization will generally provide greater protection against gamma radiation than use of small structures. As with evacuation, delay in taking shelter during plume passage will result in higher exposure to radiation.

ED_001057C_T3_00046687

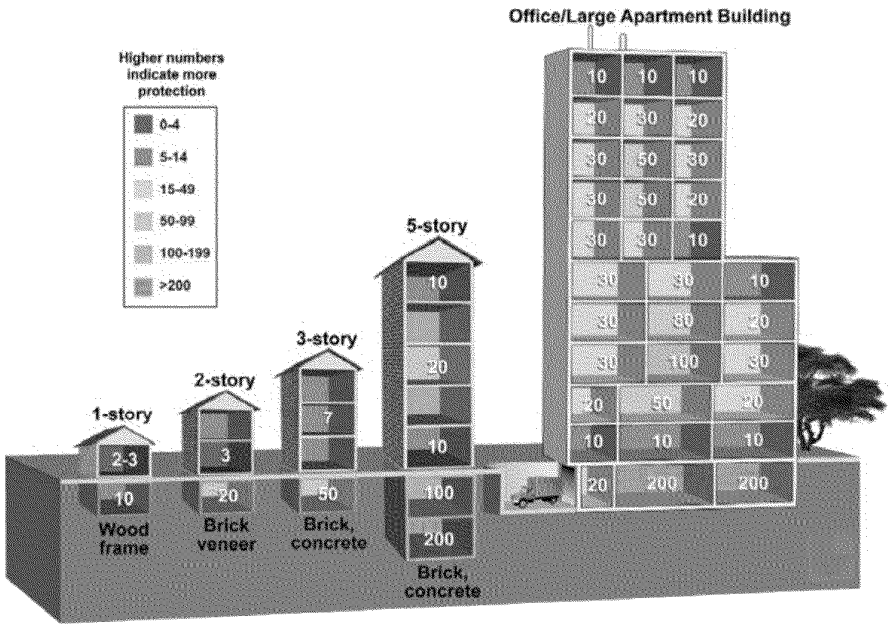


Figure 2-1: **Exposure reduction as a function of building type and location.** The numbers represent dose reduction factors. A dose reduction factor of 10 indicates that a person in that area would receive 1/10th of the dose of a person in the open. A dose reduction factor of 200 indicates that a person in that area would receive 1/200th of the dose of a person out in the open. Figure taken from *Planning Guidance for Response to a Nuclear Detonation*, *Second Edition*, National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats, June 2010.

Sheltering-in-place decisions should be based on the types of radioactive materials released and the likely exposure pathway. If the primary exposure pathway is external dose from the plume or deposited materials, shelter construction and shelter size are the most important considerations. Whole body external dose is reduced with increasing—

a. wall thickness, structure size, and number of stories overhead
b. distance from the external walls of the building
c. height of the cloud with respect to the building.

If inhalation is the primary exposure pathway, reducing air exchange rates will reduce dose. Cracks and openings should be sealed with cloth or weather stripping, tape, etc. Sealing of shelter spaces may pose a health risk, especially to infants and the infirm. The use of a towel or a handkerchief as an improvised mask to filter the inhaled air may also reduce dose from inhalation. Persons sheltering-in-place should open the shelters after the plume has passed to reduce airborne activity trapped inside, and should leave high exposure areas when instructed by authorities in order to avoid exposure to deposited radioactive material.

Although sheltering-in-place will reduce the gamma exposure rate from deposited materials, it is not a suitable protective action for more than one or two days.

ED_001057C_T3_00046687

2.3.5 Thyroid Protection during the Early Phase

Release of radioactive iodine poses disproportionately high risk for nonfatal thyroid cancer and nodules. This section provides additional guidance to limit these risks (see footnote to Table 2-1). The committed dose equivalent to thyroid (the quantity used to express the PAG) encompasses only the risk of fatal cancer from irradiation of organs within the body and does not include dose to skin.

The use of potassium iodide (KI) to block thyroid uptake of inhaled radioiodine is an effective supplemental protective action that can be used during evacuations and sheltering-in-place. KI is most effective when administered immediately prior to exposure to radioiodine. However, administration of KI within one or two hours after uptake of radioiodine can still significantly block the thyroid dose.

FDA updated its guidance on the use of KI as a thyroid blocking agent during radiological emergencies in 2001 (FDA 2001 and FDA 2002). FDA based these dose recommendations on a review of the thyroid cancer data from the Chernobyl reactor accident of April 1986 and the experience of Poland in administering KI following the Chernobyl release (FDA 2001).

FDA recommends the following—

- Children 0-18 years of age: Administer KI when the projected radiation dose to the thyroid is 5 rem (50 mSv) or greater.
- Pregnant and lactating women: Administer KI when the projected radiation dose to the thyroid is 5 rem (50 mSv) or greater.
- Adults up to 40 years of age: Administer KI when the projected radiation dose to the thyroid is 10 rem (100 mSv) or greater.
- Adults over 40 years of age: Administer KI when the projected radiation dose to the thyroid is over 500 rem (5 Sv) in order to prevent hypothyroidism.

However, FDA understands that a KI administration program that sets different projected thyroid radioactive exposure thresholds for treatment of different population groups may be logistically impractical to implement during a radiological emergency. In such cases, FDA recommends that KI be administered to both children and adults at the lowest intervention threshold (i.e., >5 rem (50 mSv) projected internal thyroid exposure in children) (FDA 2002).

The protective effect of a single dose of KI lasts approximately 24 hours. It should be administered daily until the risk of significant exposure to radioiodine (either by inhalation or ingestion) no longer exists.

It should be noted that adults over 40 need to take KI only in the case of a projected large internal radiation dose to the thyroid (>500 rem) to prevent hypothyroidism which could lead to lifelong dependence on thyroid hormone replacement therapy. Thyroid irradiation in older adults (i.e., over 40 years of age) is associated with an extremely low incidence of cancer (FDA 2001).

Some people should not take KI. As a rule, individuals with known allergy to potassium iodide or with pre-existing thyroid disease (e.g., Graves' disease, thyroid nodules, Hashimoto's thyroiditis) that might predispose them to adverse reactions should avoid KI.

Pregnant women should not be given repeated doses except during severe contamination/exposure events. In such a case, neonates should be monitored for thyroid function. Since radioiodines pass into breast milk, lactating mothers should avoid breastfeeding their infants after potential exposure to the release of radioiodines. If a lack of alternative infant food necessitates breastfeeding, then repeat dosing to the mother with KI should be avoided. However, if the mother must continue to breastfeed her infant during an event with ongoing exposure to radioiodines, then additional doses of KI to the mother may be necessary.

Individuals at risk from KI reactions should be given priority with respect to other protective measures such as sheltering-in-place, evacuation, and food supply control.

Once the plume has passed and protective actions such as evacuation and/or sheltering-in-place are implemented, food control measurements to limit exposure to radioiodine should be implemented and the administration of KI should be suspended. Food control measures include providing the public with non-contaminated food supplies

ED_001057C_T3_00046687

while awaiting the eventual radioactive decay of contaminated food. As a result of radioactive decay, grain products and canned milk and vegetables from sources affected by radioactive fallout will not present a risk from radioiodine if they have been stored for weeks to months after production.

An RDD is not likely to contain radioiodine, so administration of KI would not be necessary in such incidents. The administration of other prophylactic drugs should be evaluated on a case-by-case basis depending on the nature of the event and the radioisotopes involved (DHS 2008).

2.3.6 PAGs and Nuclear Facilities Emergency Planning Zones

The Nuclear Regulatory Commission (NRC) requires designation of an emergency planning zone (EPZ) within a 10-mile (16.1 km) radius around all commercial nuclear power plants. The plants must maintain detailed radiological response plans for this designated area. NRC also requires designation of a separate ingestion pathway EPZ within a 50 mile (80.5 km) radius around all commercial nuclear power plants. Guidance for developing emergency response plans for implementation of immediate protective actions for incidents at commercial nuclear power plants is contained in NUREG-0654/FEMA-REP-1 (NRC 1980)[8] and partially bases the size and shape of recommended EPZs on numerical values of PAGs issued in previous versions of this Manual.

Planning for incidents at other types of nuclear facilities should be developed using similar considerations. Information on the offsite consequences of incidents that can occur at commercial fuel cycle and material facilities licensed by the NRC can be found in NUREG-1140 (NRC 1988). The "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants" (NRC and EPA 1978) recommends that states designate an EPZ for protective action for plume exposure.

Within this zone, an area should be predesignated for immediate response based on specified plant conditions prior to a release, or, given a release, prior to the availability of information on quantities of radioactive materials released. The shape of this area will depend on local topography, as well as political and other boundaries. Additional areas of the EPZ, particularly in the downwind direction, may require evacuation or sheltering-in-place, as determined by dose projections. The size of these areas will be based on the potential magnitude of the release and on an angular spread determined by meteorological conditions and any other relevant factors.

The predesignated areas for immediate protective action may be reserved for use only in the most severe incidents and in cases when the facility operator cannot provide a quick estimate of projected dose based on actual releases. For lesser incidents, or if the facility operator is able to provide prompt offsite dose projections, the area for immediate protective action may be specified at the time of the incident instead of using a predesignated area.

Such prompt offsite dose projections may be possible when the facility operator can estimate the potential offsite dose, based on information at the facility, using relationships developed during planning that relate abnormal plant conditions and meteorological conditions to potential offsite doses. After the release starts and the release rate is measurable, or when plant conditions or measurements can be used to estimate the characteristics and rate of the release, then these factors, along with atmospheric stability, wind speed, and wind direction, can be used to estimate integrated concentrations of radioactive materials as a function of location downwind. Although such projections are useful for initiating protective action, the accuracy of these methods for estimating projected dose will be uncertain prior to confirmatory field measurements because of unknown or uncertain factors affecting environmental pathways, inadequacies of computer modeling, and uncertainty in the data for release terms.

There has been some confusion among emergency planners between these EPZs and the areas potentially subject to PAGs. It is not appropriate to use the maximum distance where a PAG might be exceeded as the basis for establishing the boundary of the EPZ for a facility. The EPZs should be large enough to cover affected urban and rural areas and accommodate the various organizations needed for emergency response.[9] EPZs are not necessary at those facilities where it is not possible for PAGs to be exceeded offsite.

---

[8] Immediate protective actions based on in-plant conditions are not applicable to naval nuclear propulsion plants. The possible dose and size of the area of potential concern is small for naval nuclear propulsion plants.

[9] The development of EPZs for nuclear power facilities is discussed in the NUREG 0396.

ED_001057C_T3_00046687

2.4 Dose Projections

The PAGs in this chapter are specified in terms of the effective dose equivalent. This dose includes that incurred from external gamma exposure of the whole body as well as the committed effective dose equivalent from inhaled radionuclides. Guidance is also provided on the committed dose equivalent to thyroid. Further references to effective or organ dose equivalent refer to these two quantities, respectively. The Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals (DOE 2010)[10] provide detailed methods for estimating projected dose. These methods require knowledge of, or assumptions for, the intensity and duration of exposure and make use of standard assumptions on the relation, for each radioisotope, between exposure and dose. Exposure and dose projections should be based on the best estimates available. The FRMAC methods and models may be modified as necessary for specific sites for improved accuracy.

2.4.1 Dose Projection during the Early Phase

PAGs are expressed in terms of projected dose. However, in the early phase of an incident, parameters other than projected dose may frequently provide a more appropriate basis for decisions to implement protective actions. When a facility is operating outside its design basis and a substantial release to the environment has started, or is imminent but has not yet occurred, data adequate to directly estimate the projected dose may not be available. Emergency response plans should anticipate specific conditions at the source of a potential release and the possible consequences offsite. Emergency response plans for nuclear power plants and facilities should make use of Emergency Action Levels (EALs), based on in-plant conditions, to trigger notification and recommendations to offsite officials on evacuation or sheltering-in-place.[11] Later, when environmental data become available, dose projections based on measurements may also be used as the basis for implementing further protective actions. In the case of transportation accidents, an RDD or IND, or other incidents that are not related to a facility, it will often not be practicable to establish EALs.

The calculation of projected doses should be based on realistic dose models, to the extent practicable. Doses incurred prior to initiation of a protective action should not normally be included since the PAGs are based on doses that can be avoided by the protective action. Similarly, doses that might be received following the early phase should not be included for decisions on whether to evacuate or shelter. Doses that may be incurred from ingestion of food and water, long-term radiation exposure to deposited radioactive materials, or long-term inhalation of resuspended materials are chronic exposures for which neither emergency evacuation nor sheltering-in-place are appropriate protective actions. PAGs for the intermediate phase cover these exposure pathways (See Chapter 3). As noted earlier, the projection of doses in the early phase needs to include only those exposure pathways that contribute a significant fraction (i.e., more than 10 percent) of the dose to an individual.

In practical applications, dose projection will usually begin at the time of the anticipated (or actual) start of a release. For those situations where significant dose has already occurred prior to implementing protective action, the projected dose for comparison to a PAG should not include this prior dose.

2.4.2 Duration of Exposure

The projected dose for comparison to the early phase PAGs is normally calculated for exposure during the first four days following the projected (or actual) start of a release. The objective is to encompass the entire period of exposure to the plume and deposited material prior to implementation of any further, longer-term protective action such as relocation. For planning purposes, the four-day period is chosen as the duration of exposure to deposited materials during the early phase because it is a reasonable estimate of the time necessary to make measurements, reach decisions, and prepare to implement further protective actions (such as relocation) if necessary. However, officials at the site at the time of the emergency may decide that a different time frame is more appropriate.

Protective actions are taken to avoid or reduce projected doses. Doses incurred before the start of the protective action being considered should not normally be included in evaluating the need for protective action. Similarly, doses that may be incurred at later times than those affected by the specific protective action should not be included.

---

[10] See: http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL1.pdf
http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL2.pdf

[11] EALs and immediate protective actions based on in-plant conditions are not applicable to naval nuclear propulsion plants.

ED_001057C_T3_00046687

For example, doses that may be incurred through ingestion pathways or long-term exposure to deposited radioactive materials take place over a different, longer time period. Protective actions for such exposures should be based on guidance addressed in other chapters.

The projected dose from each radionuclide in a plume is proportional to the time-integrated concentration of the radionuclide in the plume at each location. This concentration will depend on the rate and the duration of the release and meteorological conditions. Release rates will vary with time, and this time-dependence cannot usually be predicted accurately. In the absence of more specific information, the release rate may be assumed to be constant.

Another factor affecting the estimation of projected dose is the duration of the plume at a particular location. For purposes of calculating projected dose from most pathways, exposure will start at a particular location when the plume arrives and will end when the plume is no longer present. Exposure from one pathway (exposure to deposited materials) will continue for an extended period. Other factors such as the aerodynamic diameter and solubility of particles, shape of the plume, and terrain may also affect estimated dose and may be considered on a site- or source-specific basis.

Prediction of time frames for releases is difficult because of the wide range associated with the spectrum of potential incidents. Therefore, planners should consider the possible time periods between an initiating event and arrival of a plume, and the duration of releases in relation to the time needed to implement competing protective actions (i.e., evacuation and sheltering-in-place). Analyses of nuclear power reactors (NRC 1975) have shown that some incidents may take several days to develop to the point of a release while others may begin as early as 1.5 hours after an initiating event. Furthermore, the duration of a release may range from less than 1 hour to several days, with the major portion of the release usually occurring within the first day.

Radiological exposure rates from a plume are influenced by wind speed. As a general rule, air concentration is inversely related to the wind speed at the point of release. Concentrations are also affected by the turbulence of the air, which tends to increase with wind speed and sunlight, and by wandering of the plume, which is greater at the lower wind speeds. This results in higher concentrations generally being associated with low winds near the source and with moderate winds at larger distances. Higher wind speed also shortens the travel time of the plume. Planning information on time frames for releases from nuclear power facilities may be found in References NRC 1978 and EPA 1978. Time frames for releases from other facilities will depend on the characteristics of the facility.

2.5 Derived Response Levels and Dose Conversion Factors

A derived response level (DRL) is a level of radioactivity in an environmental medium that would be expected to produce a dose equal to its corresponding PAG. A dose conversion factor (DCF) is any factor used to change an environmental measurement to dose in the units of concern. Depending on the exposure pathway, other factors besides the DCF may be required to convert an environmental measurement into a dose.

The FRMAC Assessment Manuals (DOE 2010)[12] provide guidance in calculating DRLs and DCFs based on the International Commission on Radiological Protection (ICRP) dosimetry models (ICRP 60 series). In addition, the Federal Radiological Preparedness Coordinating Committee (FRPCC) encourages the use of computational tools such as DOE's *Turbo FRMAC* and NRC's *Radiological Assessment System for Consequence Analysis (RASCAL)*

[12] See: http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL1.pdf
http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL2.pdf

ED_001057C_T3_00046687

2.6 Radiation Risks in Emergency Response and Planning for Implementation of the Protective Action Guides[13]

Worker and public protection guidance and standards for normal operations are typically developed through risk management approaches and are implemented in federal and state regulations (e.g., 10 CFR Part 20; 10 CFR Part 835; 29 CFR Part 1910.1096). However, many factors or decision criteria in a radiological emergency differ from those in normal operations. Some of the key decision criteria differences between emergency PAGs and typical occupational and public protection standards are shown in Table 2-2. Although there are times when implementation of standards or guidelines can cause or enhance other risks, these secondary risks normally can be controlled. Standards for normal operations provide a margin of safety that is greater than that in guidelines for emergency response because that margin can be provided in a manner that ensures no significant increase in public health risk or detriment to the public welfare. Currently, the development of standards and guidelines for normal operations is done in a manner that provides reasonable assurance that implementation of the standards will not cause more risk than it averts.

Response organizations need to develop plans and protocols that address radiation protection during a radiological incident and that ensure appropriate training is provided to responders and decision makers. Detailed reports on radiation risk, risk management decision making, training, and public communication should be consulted in the development of plans, protocols, and training materials, and may be obtained from organizations such as ICRP, the National Council on Radiation Protection and Measurements, International Atomic Energy Agency, the American Nuclear Society, and the Health Physics Society.

Table 2-2. Different Risk Management Considerations for Emergency and Normal Operations

Emergency	Normal Operations
Radiation sources are uncontrolled with potential high and widespread contamination, and mass disruption. Key elements to radiation protection are to contain radioactivity and confine access to it.	Radiation sources are controlled and contained.
Actions must be taken as soon as possible to minimize exposures even when information on the risks is incomplete.	There is adequate time to fully characterize situations and determine risks and mitigating measures. Inaction or delays may increase costs but rarely results in consequences that cannot be mitigated.
During emergencies, the undesired consequences can be significant, uncontrollable, and unpredictable.	Consequences associated with implementation of the standard are well characterized, considered, and controlled so as not to be of concern from either a health or public welfare perspective.

2.7 Controlling Occupational Exposure and Doses to Emergency Responders

This section provides guidance on occupational doses of radiation during an emergency response. In many radiological incidents, actual exposure of workers, including emergency responders, may be controlled to low doses when proper precautions are taken. During some emergencies, radiation exposures to responders may be unavoidable and may have the potential to exceed limits used for normal operations.

Even in emergency conditions, every reasonable effort should be made to control doses to levels that are as low as practicable.

[13] Source: *Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents,* DHS/FEMA 2008

ED_001057C_T3_00046687

2.7.1 Maintaining the ''As Low As Reasonably Achievable'' Principle

To minimize the risks from exposure to ionizing radiation, employers of emergency responders should prepare emergency response plans and protocols in advance to keep worker exposures as low as reasonably achievable. These protocols should include the following health physics and industrial hygiene practices to the maximum extent possible—

- minimizing the time spent in the contaminated area (e.g., rotation of workers)
- maintaining the maximum distance from sources of radiation
- shielding of radiation sources
- tailoring of hazard controls to the work performed
- properly selecting and using respirators and other personal protective equipment (PPE)
- using prophylactic medications, where medically appropriate, that either block the uptake or reduce the retention time of radioactive material in the body.

The incident commander should be prepared to identify, to the extent possible, all hazardous conditions or substances and to perform appropriate site hazard analysis. Emergency management plans should include protocols to control worker exposures, establish exposure guidelines in advance, and outline procedures for worker protection. Emergency procedures should include provisions for exposure monitoring, worker training commensurate with the hazards involved in response operations and ways to control them, and medical monitoring.

2.7.2 Understanding Dose and Risk Relationships

Response worker guidelines are based on cumulative dose constraint levels. The occupational exposure PAG is based on an assumption that doses acquired in response to a radiological incident would be ''once in a lifetime'' doses and that future radiological exposures would be substantially lower.

PAG recommendations in this document provide a guideline level of 5 rem (50 mSv) for worker protection and alternative response worker guidelines (see Table 2-3) for certain activities where exposures below 5 rem (50 mSv) cannot be maintained. For most radiological incidents, the radiation control measures listed in Section 2.7.1 will prevent doses from reaching the 5 rem (50 mSv) occupational exposure PAG while performing typical emergency response activities such as transportation, firefighting, and medical treatment of contaminated victims at hospitals. However, in those situations in which victims are injured or trapped in high radiation areas or can only be reached via high radiation areas, exposure control options may be unavailable or insufficient, and doses above 5 rem (50 mSv) may be unavoidable.

Decisions to take response actions that could result in doses in excess of 5 rem (50 mSv) can only be made at the time of the incident, under consideration of the actual situation. In such situations, incident commanders and other responders need to understand the risk posed by such exposures in order to make informed decisions. The Response Worker Guidelines for life and property saving activities in Table 2-3 are provided to assist such decision-making.

The special catastrophic event of an IND detonation could result in firestorm and widespread destruction of structures. The emergency intervention needed to prevent further destruction and loss of life may result in increased exposure to emergency response personnel. Exceeding the Response Worker Guidelines in Table 2-3 may be unavoidable in responding to such events. Emergency responders undertaking a mission covered under the alternative occupational PAG levels should be informed when radiation control measures may not prevent doses from exceeding the 5 rem (50 mSv), general occupational exposure PAG and should be made fully aware of the sub-chronic and chronic risks involved, including numerical estimates of the risk of delayed effects.

ED_001057C_T3_00046687

Table 2-3. Response Worker Guidelines

Total effective dose equivalent (TEDE) guideline	Activity	Condition
5 rem	All occupational exposures	All reasonably achievable actions have been taken to minimize dose.
10 rem[a]	Protecting valuable property necessary for public welfare (e.g., a power plant).	Exceeding 5 rem unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.
25 rem[b]	Lifesaving or protection of large populations	Exceeding 5 rem unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.

[a]For potential doses >10 rem, special medical monitoring programs should be employed, and exposure should be tracked in terms of the unit of absorbed dose (rad) rather than TEDE (rem).
[b]In the case of a very large incident, such as an IND, incident commanders may need to consider raising the property and lifesaving response worker guidelines to prevent further loss of life and massive spread of destruction.

The 25 rem (250 mSv) lifesaving Response Worker Guidelines provide assurance that exposures will not result in detrimental deterministic health effects (i.e., prompt or acute effects). Response actions that could cause exposures in excess of the 25 rem (250 mSv) alternative Response Worker Guideline should only be undertaken with an understanding of the potential acute effects of radiation to the exposed responder (Table 2-4) and only when the benefits of the action clearly exceed the associated risks.

The estimated risk of fatal cancer [14] for workers exposed to 10 rem (100 mSv) is 0.6 percent (6 cases per thousand exposed). Workers exposed to 25 rem (250 mSv) have an estimated risk of fatal cancer of 1.5 percent (15 cases per thousand exposed). Because of the latency period of cancer, younger workers face a larger risk of fatal cancer than older workers (for example, when exposed to 25 rem, 20 to 30-year-olds have a 9.1 per thousand risk of premature death, while 40 to 50-year-olds have a 5.3 per thousand risk of premature death).[15]

More specific risk determinations can be made when there is adequate information about the contaminants and the potential for human exposure. Reference EPA 1998 and the EPA Health Effects Assessment Summary Tables have risk factors for specific radionuclides.

Table 2-4. Acute Radiation Syndrome[a]

Feature or Illness	**Effects of Whole Body Absorbed Dose from external radiation or internal absorption, by dose range in rad**				
	0-100	100-200	200-600	600-800	>800
Nausea, Vomiting	None	5-50%	50-100%	75-100%	90-100%
Time of Onset		3-6 h	2-4 h	1-2 h	<1 h to minutes
Duration		<24 h	<24 h	<48 h	<48 h
Lymphocyte Count	Unaffected	Minimally Decreased	<1000 at 24 h	<500 at 24 h	Decreases within hours
Central Nervous System Function	No Impairment	No Impairment	Cognitive impairment for 6-20 h	Cognitive impairment for > 20 h	Rapid incapacitation
Mortality	None	Minimal	Low with aggressive therapy	High	Very High: Significant neurological symptoms indicate lethal dose

[a]Prompt health effects with whole-body absorbed doses received within a few hours.

[14]Risk per dose of a fatal cancer is assumed to be about $6x10^{-4}$ per rem. Cancer incidence is assumed to be about $7x10^{-4}$ per rem. (EPA 1998)
[15] The numerical estimate of cancer risk presented above (from Federal Guidance #13) was obtained by linear extrapolation using the nominal risk estimates based on data from human exposures at high doses and high dose rates. Other methods of extrapolation to the low-dose region could yield higher or lower numerical estimates of cancer deaths. Studies of human populations exposed at low doses are inadequate to demonstrate the actual magnitude of risk at low doses (about 0.1 Sv or 10 rem and below). There is scientific uncertainty about cancer risk in the low-dose region below the range of epidemiological observation, and the possibility of no risk cannot be excluded.(EPA 1998)

ED_001057C_T3_00046687

2.7.3 Incident Commanders and Responders Need Proper Training in Advance

When the 5 rem guideline is exceeded, workers should be provided the following—

- medical follow-up
- training with respect to the risk associated with exposure to ionizing radiation
- a thorough explanation of the latent risks associated with receiving exposures greater than 5 rem (50 mSv).

In addition, these guidelines represent dose constraint levels (e.g., when this level of dose is accumulated, the responder should not take part in the later stages of the response that may significantly increase their dose). Incident commanders and responders need a thorough understanding of the worker exposure guidelines for radiological emergency response, including the associated risks and specific worker protection procedures. The FRMAC *Radiological Emergency Response Health and Safety Manual* (May 2001) provides detailed information.

2.7.4 Occupational Safety and Health Act (OSHA) Standards and their State Equivalents

Under the provisions of the Occupational Safety and Health Act (OSHA), and equivalent statutes in the 26 states that operate OSHA-approved state plans, each employer is responsible for the health and safety of its employees. In accomplishing this, employers are expected to comply with the requirements of the Federal OSHA or state plan occupational safety and health standards applicable in the jurisdiction in which they are working. States with state plans enforce standards, under state law, which are ''at least as effective as'' Federal OSHA standards, and therefore may have more stringent or supplemental requirements. There are currently 22 states and jurisdictions operating complete state plans (covering both the private sector and state and local government employees, including state and local emergency responders). Four of these state plans cover public (state and local government) employees only. The primary occupational safety and health standard for emergency response is the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR Part 1910.120). EPA has a Worker Protection (40 CFR Part 311) standard that applies the HAZWOPER standard to state and local workers in states that do not have their own occupational safety and health program.

For emergency response, the OSHA standard (among many other requirements) states that ''the individual in charge of the incident command system shall identify to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies'' (29 CFR Part 1910.120(q)). As part of emergency preparedness activities, individuals authorized as incident commanders should receive the necessary training and planning prior to the incident, use the hazard information available, consult relevant standards, and apply all feasible and useful measures to minimize hazards to emergency responders.

OSHA's ionizing radiation standard (29 CFR Part 1910.1096), which may also apply in certain circumstances, limits quarterly dose [16] and includes other requirements such as monitoring, recordkeeping, training, and reporting.

The worker exposure levels are not PAGs but instead are regulatory limits that cannot be exceeded except under certain conditions. These occupational limits allow workers to receive radiation exposure during the course of performing their jobs. This limit offers the possibility that industrial and manufacturing facilities, critical infrastructures, and other business operations could be reopened without having to be cleaned up as long as they are in compliance with the 5 rem (50 mSv) dose limit and other OSHA requirements found in 29 CFR Part 1910.1096. Otherwise, the relocation PAGs could be used by decision makers to protect their citizens.

2.7.5 DOE Occupational Standards

DOE employees and contractors (except for Naval Nuclear Propulsion Program (NNPP) employees and contractors) are subject to DOE radiation protection regulations; requirements for worker protection from radiation exposure are contained in 10 CFR Part 835. These requirements apply to all DOE employees and contractors that may be exposed to ionizing radiation as a result of their work for DOE, including work relating to emergency response activities. Section 835.3(d) indicates that nothing in the regulation ''shall be construed as limiting actions that may be necessary to protect health and safety.'' This clause is intended to recognize the fact that during emergencies,

---

[16] 1.25 rem if cumulative lifetime dose is less than 5(n–18), where n is the worker's age at the last birthday, and adequate past and current exposure records are maintained to show exposures do not exceed the standard's radiation levels (29 CFR 1910.1096).

ED_001057C_T3_00046687

lifesaving or property-saving actions may necessitate actions that have the potential to cause doses in excess of the Department's radiation dose limits. Subpart N of Part 835 provides direction for emergency exposure situations and indicates that—

- the risk of injury should be minimized
- actual and potential risks should be weighed against benefits of such actions causing exposures
- no individual should be forced to perform a rescue action that involves substantial personal risk.

Individuals authorized to perform emergency actions that may result in exposures exceeding DOE dose limits should receive prior training and briefing on known or anticipated hazards. Under all circumstances, doses should be maintained as low as is reasonably achievable. Under DOE requirements, emergency response doses are not included with worker doses measured and calculated to demonstrate compliance with 10 CFR Part 835 dose limits. Requirements for radiation protection for NNPP employees and contractors are maintained in NNPP instructions. Requirements for the protection of those emergency workers are consistent with 10 CFR Part 835 and this Manual.

2.7.6 NRC Occupational Standards

Requirements for the protection of NRC employees are covered by NRC Management Directive 10.131, ''Protection of NRC Employees Against Ionizing Radiation.'' Section VI, Guidance for Emergency Exposure Controls During Rescue and Recovery Activities, deals specifically with radiation exposure control during emergencies. For an IND incident, the radiological consequences could be so severe that many workers would be exposed in activities, such as emergency lifesaving functions, that would result in doses in excess of the 5 rem (50 mSv) limit for normal occupational activities.

2.7.7 Contamination Limits and Monitoring of the Environment and Populations

Areas under the plume can be expected to contain deposited radioactive materials if aerosols or particulate materials were released during the incident. In extreme cases, individuals and equipment may be highly contaminated and screening stations will be required for emergency monitoring, decontamination of individuals, and medical evaluations. Equipment should be checked and decontaminated as necessary to avoid the spread of contamination to other locations. This screening service would be required for only a few days following plume passage until all such persons have been evacuated or relocated.

Adults may reenter restricted areas under controlled conditions in accordance with occupational exposure standards. The need for monitoring stations should be evaluated along highways to control surface contamination at exits from the more highly contaminated areas. Decontamination and other measures should be implemented to maintain low-exposure rates at monitoring stations.

A contaminated individual or item should not be released to an unrestricted area. It may be acceptable to release contaminated materials if the level of surface contamination is comparable to the levels immediately outside the restricted area. As an alternative to decontamination, contaminated items (i.e., not persons or animals) may be retained in the restricted area while the radiological contamination decays.

Persons working in the parts of the restricted areas in which their annual dose from the residual radioactivity would exceed 2 mrem (0.05 mSv) in any hour or 100 mrem (1 mSv) in a year should operate under the controlled conditions normally established for occupational exposure.

ED_001057C_T3_00046687

KEY POINTS IN CHAPTER 2

- The principal protective actions for the early phase are evacuation or sheltering-in-place. Evacuation is the movement of individuals away from the path of the plume. Sheltering-in-place refers to the use of a readily available structure that will provide protection from exposure to the plume.
- The PAG for evacuation or sheltering-in-place is a projected dose of 1 rem (10 mSv) over four days.
- Evacuation is appropriate when its risks and secondary effects are less severe than the risk of the projected radiation dose. Evacuation can be 100 percent effective in avoiding dose if completed before plume arrival.
- In general, sheltering-in-place should be preferred to evacuation whenever it provides equal or greater protection. Sheltering-in-place is usually not appropriate for areas where high doses are projected or for exposure lasting longer than two complete air exchanges of the shelter.
- The administration of potassium iodide (KI) to partially block the uptake of radioiodines by the thyroid is a supplemental protective action. The PAG for administration of KI is 5 rem projected dose to child thyroid.
- Dose calculations for PAGs are made using the dose conversion factors (DCFs) and derived response levels (DRLs) referenced in the FRMAC Assessment Manuals.

ED_001057C_T3_00046687

Chapter 3
Protective Action Guides for the Intermediate Phase

3.1 Introduction

This chapter presents PAGs for the intermediate phase and provides guidance for the implementation of corresponding protective actions. A PAG is the projected dose to an individual from the release of radioactive material at which a specific protective action should be taken to reduce or avoid that dose. The intermediate phase is defined as the period beginning after the source and releases have been brought under control and environmental measurements are available for use as a basis for decisions on protective actions and extending until these protective actions are terminated. The intermediate phase may last from weeks to months; but is assumed to last for one year for purposes of dose projection.

During the early phase, decisions usually must be made and implemented quickly by state and local officials before federal assistance is available. In contrast, many decisions and actions during the intermediate phase may be taken after federal resources are present, as described in the Nuclear/Radiological Incident Annex of the *National Response Framework*. Decisions will be made during the intermediate phase concerning whether particular areas or properties from which persons have been evacuated will be decontaminated and reoccupied or condemned and the occupants permanently relocated.

The PAGs and corresponding protective actions provided in this chapter are intended for use by state and local officials in developing their radiological emergency response plans to protect the public from exposure to radiation from deposited radioactive materials. Due to the wide variety of types of radiological incidents and radionuclide releases that could occur, it is not practical to provide implementing guidance for every possible situation.

This chapter also provides guidance for translating radiological conditions in the environment into projected doses that serve as the basis for decisions to take appropriate protective actions.

3.2 Exposure Pathways during the Intermediate Phase

During the intermediate phase, the principal exposure pathways for the public occupying areas contaminated with deposited radioactive materials are—

- **exposure of the whole body** to external gamma radiation from deposited radioactive materials (groundshine). External gamma radiation is the expected dominant pathway for reactor and incidents involving radiological dispersion devices (RDDs) and improvised nuclear devices (INDs).
- **internal exposure** from the inhalation of resuspended materials.

Other potentially significant exposure pathways include exposure to beta radiation from surface contamination and direct ingestion of contaminated soil. These pathways are not expected to be controlling for nuclear power plant incidents (Aaberg 1989).

3.3 The Protective Action Guides and Protective Actions for the Intermediate Phase: Relocation and Dose Reduction

The principal protective actions for reducing exposure of the public to deposited radioactive materials are—

- relocation
- decontamination
- shielding
- time limits on exposure
- control of the spread of surface contamination.

Relocation is the most effective of these actions, but is usually highly disruptive. Relocation is therefore only implemented when the dose is sufficiently high to warrant it. The PAG for relocation is 2 rem (20 mSv) over the first year of exposure. After the first year, the PAG for relocation is 0.5 rem (5 mSv) per year, with cumulative dose over 50 years (including the first and second years) not exceeding 5 rem.

ED_001057C_T3_00046687

The PAG level for relocation applies to doses that can be avoided by relocation; doses already incurred prior to relocation are not included in the calculations. PAGs for protection from deposited radioactivity during the intermediate phase are summarized in Table 3-1. The basis for these values is presented in detail in Chapters 4 and 7 and Appendix E of the 1992 PAG Manual.[17]

Avoiding exceedance of the relocation PAGs may not be easy for the radionuclides typically associated with RDDs because of their longer half-lives. If these radionuclides are released, it may be necessary to relocate people in the affected areas even if exposure is less than 2 rem (20 mSv) in the first year.

In most scenarios, relocation decisions will be based on doses from whole-body and internal exposure. Food ingestion dose should be considered separately with decisions based on the FDA PAGs [18].

Other protective actions, such as simple dose reduction techniques, are generally applied to persons in areas where levels of deposited radioactivity are not high enough to warrant relocation. Dose reduction actions can range from the simple—scrubbing or flushing surfaces, removal and disposal of small spots of soil found to be highly contaminated (e.g., from settlement of water), and spending more time than usual in lower exposure rate areas (e.g., indoors)—to the difficult and time consuming processes of removal, disposal, and replacement of contaminated surfaces. The simple processes would probably be most appropriate to reduce exposure rates in contaminated areas outside the relocation area. Many of these can be carried out by the residents with support from officials for monitoring, guidance on appropriate actions and disposal. The more difficult processes will usually be appropriate for recovery of areas from which the population is relocated.

Large areas may have to be restricted under these PAGs. As the land area increases, protective actions become more difficult and costly to implement, especially when the affected area is densely populated. There may be situations where full implementation of protective actions is impracticable (e.g., a release in a large city). Informed judgment must be exercised to assure priority of protection for individuals in areas having the highest exposure rates.

Table 3-1 Protective Action Guides for Exposure to Deposited Radioactivity during the Intermediate Phase of a Radiological Incident

Protective Action Recommendation	PAG (First-Year Projected Dose)[a]	Comments
Relocate the general population.[b]	$\geq$ 2 rem	
Apply simple dose reduction techniques.[c]	<2 rem	These protective actions should be taken to reduce doses to as low as practicable levels.

[a]TEDE (TEDE - the projected sum of the effective dose equivalent from external radiation exposure (i.e., groundshine) and the committed effective dose equivalent from inhaled radioactive material). Projected dose refers to the dose that would be received in the absence of shielding from structures or the application of dose reduction techniques. These PAGs may not provide adequate protection from some long-lived radionuclides (see Section 3.7).
[b]People previously evacuated from areas outside the relocation zone defined by this PAG may return to occupy their residences. Cases involving relocation of persons at high risk from such action (e.g., patients under intensive care) may be evaluated individually.
[c]Simple dose reduction techniques include scrubbing or flushing hard surfaces, minor removal of soil from spots where radioactive materials have concentrated and spending more time than usual indoors or in other low exposure rate areas.

[17] The 1992 PAG Manual is available as a historical reference on line at: www.epa.gov/radiation/rert/pags.html
[18] Accidental Radioactive Contamination of Human Food and Animal Feeds, FDA 1998, available online: www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM094513.pdf

ED_001057C_T3_00046687

3.3.1 The Population Affected

The PAGs for relocation are intended for use in establishing the boundary of a relocation area within an area that has been subjected to deposition of radioactive materials. During their development, consideration was given to the higher risk of effects on health to children and fetuses from radiation dose and the higher risk to some other population groups for relocation. The relocation PAGs are established at a level that will provide adequate protection for the general population—including these groups—to avoid the complexity of implementing separate protective actions for different populations.

Persons residing in contaminated areas outside the relocation area will be at some risk from radiation dose. Therefore, guidance on the reduction of dose during the first year to residents outside this zone is also provided. Monitoring and simple dose reduction efforts are recommended in these areas to reduce doses to the extent practical. Such actions are unlikely to be practical where the dose reduction achieved is less than 10 percent.

Affected populations may perceive that intermediate phase protective actions are not consistent with those taken in the early phase. Early-phase decisions on sheltering-in-place and evacuation may have been implemented prior to verification of the path of the plume. Therefore, some persons may have been evacuated from areas where actual doses are much lower than were projected. Others who were in the path of the plume may have been sheltered or not protected at all. During the intermediate phase of the response, dose projections may be revised based on environmental measurements. Persons should be relocated from areas where the projected dose exceeds the PAG for relocation without regard to prior evacuation status.

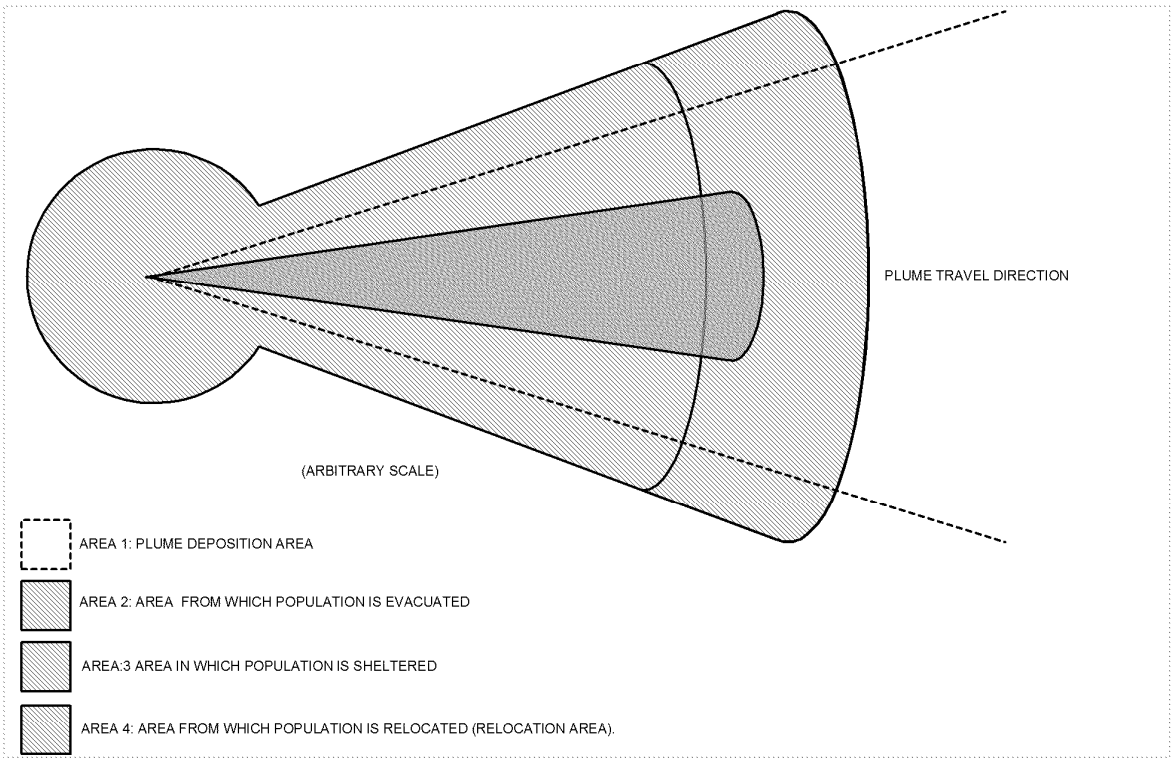


Figure 3-1. Generalized Response Areas

3.3.2 Areas Involved

Figure 3-1 provides a generalized example of the affected by different protective actions. The plume deposition area is represented by Area 1. (In reality, variations in meteorological conditions would almost certainly produce a more complicated shape, but the same principles would apply.)

ED_001057C_T3_00046687

In situations such as a nuclear power plant accident, where early warning is given prior to a release of radioactive materials, persons will already have been evacuated from Area 2 and sheltered in Area 3. Persons who have been evacuated from Area 2 or sheltered in Area 3 may go home if environmental monitoring verifies that their residences are outside the plume deposition area (Area 1.)

Area 4 is designated a relocation area and is defined as the area where projected doses are equal to or greater than the relocation PAG. Persons residing just outside the boundary of the relocation area may receive a dose approaching the PAG for relocation if decontamination or other dose reduction efforts are not implemented.

Area 1, with the exception of the relocation area, represents the area of contamination that may continue to be occupied by the general public during the intermediate phase. Nevertheless, there will be contamination levels in this area that will require continued monitoring and dose reduction efforts other than relocation.

The relative positions of the boundaries shown in Figure 3-1 depend on areas evacuated and sheltered and the radiological and meteorological characteristics of the release. For example, Area 4 (the relocation area) could fall entirely inside Area 2 (area evacuated), so that the only persons to be relocated would be those residing in Area 4 who were either missed in the evacuation process or who, because of the high risk for their evacuation, had remained sheltered during plume passage.

3.3.3 Priorities

In most cases, protective actions during the intermediate phase will be carried out over a relatively long period of time (e.g., months). It is therefore useful to consider what priorities are appropriate. Priorities are especially important when the affected area is so large that it is impractical to relocate all of the public, especially from areas that barely exceed the PAGs for relocation. The following priorities are appropriate—

- As a first priority, protect all persons from doses that could cause acute health effects from all exposure pathways, including previous exposure to the plume.
- Recommend the application of simple decontamination techniques and that persons remain indoors as much as possible to reduce exposure rates.

3.4 Sequence of Events

Following passage of the airborne plume, several tasks must be accomplished simultaneously for the timely protection of the public. The decisions on the early task of relocating persons from high exposure rate areas must be based on exposure rate measurements and dose analyses. It is expected that monitoring and dose assessment will be an ongoing process, with priority given to the areas with the highest exposure rates. The general sequence of events is itemized below, but the time frames will overlap.

1. Based on environmental data, determine the areas where the projected one-year dose will exceed 2 rem (20 mSv) and relocate persons from those areas, with priority given for people in the highest exposure rate areas.

2. Allow previously evacuated persons to return as quickly as possible to their residences if they were evacuated from areas where field gamma measurements indicate that exposure rates are near normal background levels. If, however, there is a possibility that particles from high deposition areas could drift into the occupied areas, establish a buffer zone to restrict residential use until the situation is analyzed and dose projections are confirmed to validate that the buffer zone is no longer needed.

3. Determine the location of the isodose-rate line (Section 3.4.1) corresponding to the relocation PAG, establish the boundary of the relocation area, and relocate any persons who still reside within the zone. Also, assign any evacuees who reside within the relocation area to relocation status. Evacuated persons whose residence is in the area between the boundary of the plume deposition and the boundary to the relocation area may return gradually as dose projections allow.

ED_001057C_T3_00046687

4. Evaluate the dose reduction effectiveness of simple decontamination techniques and of sheltering-in-place in response to exposure from partial occupancy of residences and workplaces. Results of these evaluations may influence recommendations for reducing exposure rates for persons who are not relocated from areas near, but outside, the relocation area.

5. Establish a mechanism for controlling access to and egress from the relocation area. Typically this would be accomplished through control points at roadway accesses to the relocation area.

6. Establish monitoring and decontamination stations to support control of the relocation area.

7. Implement simple decontamination techniques in contaminated areas outside the relocation area, giving priority to areas with higher exposure rates.

8. Collect data needed to establish long-term radiation protection criteria for recovery and data to determine the effectiveness of various decontamination or other recovery techniques.

9. Begin operations to recover contaminated property in the relocation area.

3.4.1 Establishment of Isodose-Rate Lines

As soon as federal or other assistance is available for aerial and ground monitoring, a concentrated effort should begin to establish isodose-rate lines on maps and the identification of boundaries to the relocation area. Planning for this effort should include the development of standard maps that can be used by all of the involved monitoring and dose assessment organizations to record monitoring data.

Aerial monitoring (e.g., the Department of Energy Aerial Measuring System (AMS)) can be used to collect data for establishing general patterns of radiation exposure rates from deposited radioactive materials and may form the primary basis for the development of dose lines out to the limit of aerial detectability. Initially during the early phase, detectability is limited to exposure rate changes of a few times natural background levels. Later during the intermediate phase, more sensitive measurements detect levels of radioactivity that are a small fraction of the natural background. Periodic air sample measurements will also be needed to verify the contribution to dose from inhalation of resuspended materials.

Gamma exposure rates measured at 1 m (approximately 3.28 feet) will vary as a function of the location of the measurement within a very small area. The variation is caused by the different deposition rates for different types of surfaces (e.g., smooth surfaces versus heavy vegetation). Rinsing or precipitation could also reduce levels in some areas and raise levels in others where runoff settles. In general, where exposure rates vary within designated areas, dose projections for people residing within these areas should be estimated using an appropriate average exposure rate.

3.4.2 Dose Projection

The Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals[19] provide detailed guidance for dose projection and calculating derived response levels (DRLs) and dose conversion factors (DCFs). The FRMAC Assessment Manuals incorporate the International Commission on Radiological Protection (ICRP) dosimetry models (ICRP 60 series). In addition, the Federal Radiological Preparedness Coordinating Committee (FRPCC) encourages the use of computational tools such as DOE's Turbo FRMAC and NRC's Radiological Assessment System for Consequence Analysis (RASCAL).

The primary dose of interest for reactor incidents is the sum of the effective dose equivalent from external exposure and the committed effective dose equivalent from inhalation. The exposure periods of interest are the first year and subsequent years after the incident. Other pathways should also be evaluated, and their contributions considered, if significant. For example, anytime alpha-emitting radionuclides are involved, the inhalation of resuspended material must be considered. Although beta exposure will contribute to skin dose, its contribution to the overall risk of health effects from the radionuclides expected to be associated with reactor incidents should not be controlling in

[19] See: http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL1.pdf
http://www.nv.doe.gov/library/publications/frmac/SAND2010-1405P_VOL2.pdf

ED_001057C_T3_00046687

comparison to the whole body gamma dose (Aaberg 1989). However, the skin beta dose may be important for particulates deposited or transferred to the skin, as may be the case for an RDD that contains Strontium-90.

The dominant dose pathway for incidents involving nuclear weapons or alpha-emitters is inhalation of resuspended material. For these incidents, dispersal of alpha-emitting material must be monitored carefully using proper measurement techniques. It is possible that there will be little or no associated gamma radiation or beta activity.

Calculation of the projected gamma dose from measurements will require knowledge of the principal radionuclides contributing to exposure and their relative abundances. Radiological characteristics can be compiled either through the use of portable gamma spectrometers or by radionuclide analysis of environmental samples. Several measurement locations may be required to determine whether any selective radionuclide deposition occurred as a function of meteorology, surface type, distance from the point of release, or other factors. In accordance with the Nuclear/Radiological Incident Annex to the National Response Framework, DOE, EPA, and other federal agencies have the capability to assist state officials in performing environmental measurements, including determination of radiological characteristics of deposited materials.

The gamma exposure rate may decrease rapidly if deposited materials include a significant fraction of short-lived radionuclides. Therefore, the relationship between instantaneous exposure rate and projected first- and second-year annual doses will change as a function of time. These relationships must be established for the particular mix of deposited radioactive materials present at the time of the gamma exposure rate measurement. Over time, residual doses from gamma emitters will depend largely upon the half-lives of the radionuclides involved and could potentially remain significant over many years. It should be noted that natural attenuation as well as nuclear decay can affect long term dose assessments.

Projected dose considers exposure rate reduction from radioactive decay and, generally, weathering. When one also considers the anticipated effects of shielding from partial occupancy in homes and other structures, persons who are not relocated should receive a dose substantially less than the projected dose. For commonly assumed reactor source-terms, it is estimated that 2 rem (20 mSv) projected dose in the first year will be reduced to about 1.2 rem (12 mSv) by this factor. The application of simple decontamination techniques shortly after the incident can be assumed to provide a further 30 percent or more reduction so that the maximum first year dose to persons who are not relocated is expected to be less than 1 rem. Taking account of decay rates assumed to be associated with releases from nuclear power plant incidents (SNL 1982), and shielding from partial occupancy and weathering, a projected dose of 2 rem (20 mSv) in the first year is likely to amount to an actual dose of 0.5 rem (5 mSv) or less in the second year. The application of simple dose reduction techniques would reduce the dose further. Calculations supporting these projections are summarized in Table F-6 of the 1992 PAG Manual[20].

Keeping below the 0.5 rem (5 mSv) PAG for "out-years"—the second year and beyond—may be achieved through allowing for the decay of shorter half-life radioisotopes, through decontamination efforts, or through other means of controlling public exposures (such as limiting access to certain areas). In the case of an RDD, in which a longer half-life radioisotope would likely be utilized, reductions in dose may prove difficult to achieve without full-scale site restoration. If projected cumulative doses may exceed 5 rem, relocation should be considered.

Exposure from ingestion of food and water is normally considered independently of decisions for relocation and decontamination. In rare instances, however, where withdrawal of food or water from use would pose a health risk in itself, relocation may be an appropriate protective action against exposure via ingestion. In this case, the committed effective dose equivalent from ingestion should be added to the projected dose from other exposure pathways for decisions on relocation.

3.4.3 Projected External Gamma Dose

Projected whole body external gamma doses at 1 meter height at particular locations during the first year and second year after the incident are the parameters of interest (DOE 1988). Measurements made at 1 meter to project whole-body dose from gamma radiation should be made with instruments of the "closed window" type to avoid the detection of beta radiation. The environmental information available for calculating these doses is expected to be the current gamma exposure rate at 1 m height and the relative abundance of each radionuclide contributing

[20] The 1992 PAG Manual is available as a historical reference on line at: www.epa.gov/radiation/rert/pags.html

ED_001057C_T3_00046687

significantly to that exposure rate. Calculation models are available for predicting future exposure rates as a function of time with consideration of radioactive decay and weathering.

Relocation decisions can generally be made on the basis of the first year projected dose. However, projected doses during the second year are needed for decisions on the need for other protective actions for persons who are not relocated. Dose conversion factors (DCFs) are therefore needed to convert environmental measurements to projected dose during the first year and second year following the incident (See FRMAC Assessment Manuals). Of the many types of environmental measurements that can be made to project whole body external gamma dose, gamma exposure rate in air is the easiest to make and is the most directly linked to gamma dose rate. However, analyses of a few environmental samples (particularly, soil samples) must be coupled with gamma exposure rate to properly project decreasing dose rates.

In addition, measurements should be conducted to determine the dose reduction factors associated with simple, rapid, decontamination techniques so that these factors can be used in calculating dose to persons who are not relocated. However, these factors should not be included in calculating projected dose for decisions on relocation.

3.5 Applying the Protective Action Guides for Relocation

Establishing the boundary of a relocation area creates three types of affected persons—

1. Persons who have already been evacuated from an area that is now designated as a relocation area and who now must be assigned relocation status.
2. Persons who were not previously evacuated, but who reside inside the relocation area and should now relocate.
3. Persons who were previously evacuated, but reside outside the relocation area, and may now return home. A gradual return is recommended.

Small adjustments to the boundary of the relocation area established based on the PAG may be justified based on ease of implementation. For example, the use of a convenient natural boundary could be a logical reason for adjustment of the relocation area. However, such decisions should be supported by demonstration that exposure rates to persons not relocated can be promptly reduced by methods other than relocation to meet the PAG, as well as the longer dose objectives addressed in Section 3.7.

The relocation PAG applies principally to personal residences but may impact other facilities as well. For example, it could impact work locations, hospitals, and park lands as well as the use of highways and other transportation facilities. For each type of facility, the occupancy time of individuals should be taken into account to determine the criteria for using a facility or area. It might be necessary to avoid continuous use of homes in an area because radiation levels are too high. However, a factory or office building in the same area could be used because occupancy times are shorter. Similarly, a highway could be used at higher contamination levels because the exposure time of highway users would be considerably less than the time spent at home.

3.5.1 Exposure Limits for Persons Reentering the Relocation Area

After the relocation area is established, persons will need to reenter for a variety of reasons, including recovery activities, retrieval of property, security patrol, operation of vital services, and, in some cases, care and feeding of farm and other animals. It may be possible to quickly decontaminate access ways to vital institutions and businesses in certain areas so that they can be occupied by adults either for living (i.e., institutions such as nursing homes and hospitals) or for employment. Clearance for occupancy of such areas will require dose reduction to meet occupational exposure limits (EPA 1987). Dose projections should include both external exposure from deposited material and inhalation of resuspended deposited material for the duration of the planned exposure. Persons working in areas inside the emergency relocation area should operate under the controlled conditions normally established for occupational exposure (EPA 1987). The worker dose limitation does not need to include ongoing doses received from living in a contaminated area outside the relocation area. It is also not necessary to consider dose received previously from the plume or groundshine during the early phase of the radiological incident.

ED_001057C_T3_00046687

3.6 Surface Contamination Control

Surface contamination must be controlled both before and after relocation protective actions are implemented. The principal exposure pathways for loose surface contamination on persons, clothing, and equipment are—

a. internal doses from ingestion by direct transfer
b. internal doses from inhalation of resuspended materials
c. beta dose to skin from contaminated skin or clothing or from nearby surfaces
d. dose to the whole body from external gamma radiation.

The contamination limit should be influenced by the potential for the contamination to be ingested, inhaled, or transferred to other locations. Therefore, it is reasonable to establish lower limits for surfaces where contamination is loose than for surfaces where the contamination is fixed (except for skin). The expected period of fixed contamination on skin would be longer so a lower limit would be justified.

Surface contamination limits to control routine operations at nuclear facilities and in transporting radioactive material are generally set at levels lower than are practical for situations involving high-level, widespread contamination of the environment. The density of uncontrolled surface contamination cannot be predicted. It is not practical to set contamination limits significantly lower than residual contamination levels in uncontrolled areas.

3.6.1 Priorities for Control of Contaminated Areas

The following priorities are recommended in the early and intermediate phases—

1. Do not delay urgent medical care for decontamination efforts or for time-consuming protection of attendants, such as donning of additional anti-contamination clothing.

2. In scenarios where it might not be practical or would interfere with other priorities, do not waste effort trying to contain contaminated wash water.

3. Do not allow monitoring and decontamination to delay evacuation from high or potentially high exposure rate areas.

4. *When early screening is needed after a major incident—*
   After plume passage, it may be necessary to establish emergency contamination screening stations in areas not qualifying as low background areas. Gamma exposure rates in such areas should be less than 5 mR/h. These screening stations should be used only during the early phase after major atmospheric releases to monitor persons emerging from possible high exposure areas. The stations should be set up to provide simple (rapid) decontamination if needed, and to evaluate whether affected persons should undergo decontamination or other special care. Table 3-2 provides guidance on surface contamination levels for use if such centers are needed.

5. Establish monitoring and personnel decontamination (e.g., bathing) facilities at evacuation centers or other locations in low background areas (less than 0.1 mR/h). Encourage evacuated persons, who were exposed in areas where release of particulate materials would have warranted evacuation, to change and wash clothes, to wash other exposed surfaces such as cars and trucks and their contents and then report to these centers for monitoring. Table 3-3 provides surface contamination guidance for use at these centers. These screening levels are examples derived primarily on the basis of easily measurable radiation levels using portable instruments.

6. After the relocation area has been established, consider the need to set up monitoring and decontamination stations at exits from the more highly contaminated parts of the area. Low levels of contamination may be undetectable because of high background radiation levels at these locations. If contamination levels are undetectable, then they probably do not exceed those in the unrestricted areas and no decontamination is required. Nevertheless, these individuals should be advised to bathe and change clothes at their first opportunity—no later than within the next 24 hours. If, after decontamination, persons still exceed the limits for the station, they should be sent for further decontamination or for medical or other special attention.

ED_001057C_T3_00046687

Table 3-2.Recommended Surface Contamination Screening Levels for Emergency Screening of Persons and Other Surfaces at Screening or Monitoring Station in High Background Radiation Areas (0.1 mR/h to 1 mR/h Gamma Exposure Rate)[a]

Condition	Geiger-counter shielded-window reading	Recommended Action
Before Decontamination	<2x existing background	Unconditional release
	>2x existing background	Decontaminate Equipment may be stored or disposed of as appropriate
After Decontamination	<2x existing background	Unconditional release
	>2x existing background	Continue to decontaminate or refer to low background monitoring and decon station. Equipment may be stored for decay or disposed of as appropriate

[a]Monitoring stations in such high exposure rate areas are for use only during the early phase of an incident involving major atmospheric releases of particulates. Otherwise use Table 3-3.

Table 3-3. Recommended Surface Contamination Screening Levels for Persons and Other Surfaces at Monitoring Stations in Low Background Radiation Areas (<0.1 mR/h Gamma Exposure Rate)[a]

Condition	Geiger-counter shielded-window reading	Recommended Action
Before decontamination	<2x existing background	Unconditional release
	>2x existing background	Decontaminate
After simple[b] decontamination effort	<2x existing background	Unconditional release
	>2x existing background	Full decontamination
After full[c] decontamination effort	<2x existing background	Unconditional release
	>2x existing background	Continue to decontaminate persons Release animals and equipment
After additional full decontamination effort	<2x existing background	Unconditional full release
	>2x existing background	Send persons for special evaluation Release animals and equipment

[a]Window thickness of approximately 30 mg/cm^2 is acceptable. Recommended limits for open window readings are expressed as 2x the existing (post-incident) background in the area where measurements are being made. Corresponding levels, expressed in units related to instrument designations, may be adopted for convenience. Levels higher than 2x background (not to exceed the meter reading corresponding to 0.1 mR/h) may be used to speed the monitoring of evacuees in very low background areas.
[b]Flushing with water and wiping is an example of a simple decontamination effort.
[c]Washing or gentle scrubbing with soap or other mild detergent followed by flushing is an example of a full decontamination effort.

ED_001057C_T3_00046687

3.7 Longer-Term Objectives of the Protective Action Guides for the Intermediate Phase

It is an objective of the PAGs to assure that doses in any single year after the first will not exceed 0.5 rem (5 mSv). If projected cumulative doses over 50 years may exceed 5 rem, relocation should be considered. For source terms from nuclear power plant incidents, the PAG of 2 rem (20 mSv) projected dose in the first year is expected to meet this longer-term objective through radioactive decay, weathering, and normal part-time occupancy in structures. If the release contains long-lived radionuclides, decontamination of areas outside the relocation area may be required during the first year to meet these objectives. For situations where it is impractical to meet these objectives through decontamination, relocation should be considered even if the projected first-year dose is lower than the relocation PAG.

After the population has been protected in accordance with the PAGs for relocation, return for occupancy of the relocation areas should be governed on the basis of recovery criteria, and long-term cleanup activities should proceed.

KEY POINTS IN CHAPTER 3

- The principal protective actions for reducing exposure of the public to deposited radioactive materials are relocation, decontamination, and time limits on exposure. The PAG for relocation is 2 rem (20 mSv) over the first year of exposure. After the first year, the PAG for relocation is 0.5 rem (5 mSv) per year with cumulative dose not to exceed 5 rem over 50 years.
- Boundaries of relocation areas should be established based on the relocation PAG and site-specific geographical features such as rivers or mountains.
- Exposure limits must be set for people who must enter the relocation area to perform vital services.
- Other protective actions, such as focused decontamination and time limits on exposure, are applied to persons in areas where levels of deposited radioactivity are not high enough to warrant relocation.

ED_001057C_T3_00046687

CHAPTER 1: OVERVIEW

1.1 Protective Actions and Protective Action Guides

The U.S. Environmental Protection Agency (EPA) has developed this Manual to assist public officials in planning for emergency response to radiological incidents. This document defines a radiological incident as an event or a series of events, deliberate or accidental, leading to the release or potential release into the environment of radioactive materials in sufficient quantity to warrant consideration of protective actions. This Manual provides radiological protection criteria for application to incidents that would require consideration of protective actions, with the exception of nuclear war.

During an incident with an uncontrolled source of radiation, protection of the public from unnecessary exposure to radiation usually requires some form of intervention that will disrupt normal living. Such intervention is termed a protective action. Examples of protective actions include—

- evacuating an area
- sheltering-in-place within a building or protective structure
- administering potassium iodide (KI) as a supplemental action
- acquiring an alternate source of drinking water.

This Manual provides recommended numerical protective action guides (PAGs) for the principal protective actions available to public officials during a radiological incident. This document defines a protective action guide (PAG) as the projected dose to an individual from a release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. PAGs are guides to help officials select protective actions under emergency conditions during which exposures would occur for relatively short time periods. They are not meant to be applied as strict numeric criteria, but rather as guidelines to be considered in the context of incident-specific factors. PAGs do not establish an acceptable level of risk for normal, nonemergency conditions, nor do they represent the boundary between safe and unsafe conditions. The PAGs are not legally binding regulations or standards and do not supersede any environmental laws.

Some protective actions are not associated with a numerical PAG. For example, the control of access to areas is a protective action implemented in concert with other protective actions; it does not have its own PAG. Any reasonable action to reduce radiation dose is encouraged even if it is not associated with a PAG, such as recommending that individuals use *ad hoc* respiratory protection with a handkerchief or piece of folded cloth.

1.2 Applicability

Protective actions may be recommended for a wide range of incidents, but generally apply to incidents involving relatively significant releases of radionuclides. Radiological incidents with potential for significant releases include—

- a fire in a major facility such as a nuclear fuel manufacturing plant
- an accident at a federal weapons complex facility
- an accident at a commercial nuclear power plant
- a transportation accident involving radioactive material
- a terrorist act involving a radiological dispersion device (RDD) or yield-producing improvised nuclear device (IND).

Each type of incident would pose a unique threat to public health, and should be planned for and managed accordingly. Emergency response planning for a given facility or scenario should consider—

- the radionuclides involved
- the dynamics of the release
- feasibility of specific protective actions
- the timing of notification, response, and protective action implementation.

The decision to advise members of the public to take a protective action during a radiological incident involves a complex judgment in which the radiological risk must be weighed against the action's inherent risks. This decision may have to be made under emergency conditions, with limited information and little time to analyze options. Advance planning reduces the complexity of the decision-making process during an incident. The planning process can identify the viability of responses to various incidents, the courses of action that can be set in motion in advance, and the decisions that can only be made during an actual emergency.

The unpredictable locations of certain radiological incidents make advance planning challenging. For example, an RDD could detonate anywhere and spread radiological contaminants over a wide variety of surfaces and terrain. Emergency planners should be prepared to apply PAGs to a wide scope of facilities and circumstances.

1.3 Background on the Updated PAGs

These guides and recommendations update those found in the *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents* (EPA-400-R-92-001, May 1992), published by the United States Environmental Protection Agency (EPA 1992b) (hereinafter referred to as the "1992 PAG Manual"). This guidance was developed cooperatively with the Federal Radiological Preparedness Coordination Committee (FRPCC), with representation from the Environmental Protection Agency, the Department of Energy (DOE), the Department of Defense (DOD), the Federal Emergency Management Agency (FEMA), the Nuclear Regulatory Commission (NRC), the Department of Health and Human Services (HHS), including the Centers for Disease Control (CDC) and the Food and Drug Administration (FDA), the Department of Agriculture (USDA) and the Department of Labor (DOL).

1.3.1 Legal Basis

The historical and legal basis of EPA's role in this guidance begins with Reorganization Plan No. 3 of 1970, in which the Administrator of EPA assumed all the functions of the Federal Radiation Council (FRC), including the charge to "…advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States." (Reorg. Plan No. 3 of 1970, sec. 2(a) (7), 6(a) (2); Atomic Energy Act of 1946, as amended). Recognizing this role, FEMA directed EPA in their Radiological Emergency Planning and Preparedness Regulations to "establish Protective Action Guides (PAGs) for all aspects of radiological emergency planning in coordination with appropriate Federal agencies." (44 CFR §351.22(a)). FEMA also tasked EPA with preparing "guidance for State and local governments on implementing PAGs, including recommendations on protective actions which can be taken to mitigate the potential radiation dose to the population (44 CFR §351.22(b)). All of this information was to "be presented in the Environmental Protection Agency (EPA) 'Manual of Protective Action Guides and Protective Actions for Nuclear Incidents.' (44 CFR §351.22(b)).

Additionally, section 2021(h) of the Atomic Energy Act Reorg. Plan No. 3 charged the Administrator with performing "such other functions as the President may assign to him [or her] by Executive order." Executive Order 12656 states that the Administrator shall "[d]evelop, for national security emergencies, guidance on acceptable emergency levels of nuclear radiation…." (Executive Order No. 12656, sec.1601(2)). EPA's role in the development of PAGs was also recognized in the *National Response Framework, Nuclear/Radiological Incident Annex* of June 2008.

1.3.2 Technical Basis

The FRC introduced the concept of a PAG in a series of recommendations issued in the 1960s. A key concept about PAGs is that the decision to implement protective actions should be based on the projected dose that would be received if the protective actions were not implemented. Developers of the EPA PAGs considered the following three principles in establishing exposure levels for the PAGs—

1. Prevent acute effects.
2. Balance protection with other important factors and ensure that actions result in more benefit than harm.
3. Reduce risk of chronic effects.

These principles apply to the determination of any PAG. Principles 1 and 2 have been proposed for use by the international community as essential bases for decisions to intervene during an incident. Principle 3 has been recognized as an appropriate additional consideration (IAEA 1989). Although it is important during emergency planning to consider a range of source terms to assess the costs associated with their implementation, the PAGs are pre-determined for use in emergencies without regard to the magnitude or type of radiological release.

1.3.3 Changes in Scenarios since the Issuance of the 1992 PAG Manual

EPA's 1992 PAG Manual provided emergency management officials at the federal, state, tribal and local levels with the technical basis to plan responses to radiological emergencies. The 1992 PAG Manual was written to accommodate the worst release scenario deemed likely at the time – a major accident at a commercial nuclear power plant that would result in a significant offsite release of radioactive material. ("Site" and "offsite" in this Manual refer to locations where the radiological incident occurs and are not limited to facility-type incidents.) Certain characteristics typify nuclear power plants, including—fixed locations at which an accident might occur; a known suite of radionuclides on site that are dominated by short-lived radioisotopes; tight regulatory controls and requirements; skilled operational personnel who plan for and exercise emergency responses; state and local involvement in emergency planning; well-developed and zoned emergency evacuation plans and routes; and advance notice (generally hours to days) from deteriorating plant conditions prior to accidental release of radioactive material into the environment. Therefore, the 1992 PAG Manual provided decision-makers with radiation dose-based PAG values various exposure pathways (such as whole body, skin dose, and food ingestion), and associated protective actions that were adapted to the mix of radionuclides and operational environments associated with commercial nuclear power plants.

In late 1992, EPA conducted a symposium titled "Implementing Protective Actions for Radiological Incidents at Other Than Nuclear Power Reactors," to evaluate PAGs for incidents other than accidents at nuclear power plants and concluded that the PAGs could be applied to all radiological incidents (EPA 1992a). Since then, new radiological and nuclear scenarios involving terrorist use of a radiological dispersion device (RDD) or an improvised nuclear device (IND) have gained status in radiological emergency response planning. An RDD is a device or mechanism that is intended to spread radioactive material from the detonation of conventional explosives or other means. An IND is a crude, yield-producing nuclear weapon fabricated from diverted fissile material. Incidents like these may occur anywhere with little or no warning.

1.3.4 Key Changes to PAGs in this Updated Manual

This updated Manual applies PAGs and protective actions to an expanded range of sources of potential radiological releases, including commercial nuclear power facilities, uranium fuel cycle facilities, nuclear weapons facilities, transportation accidents, radiopharmaceutical manufacturers and users, space vehicle launch and reentry, RDDs, and INDs.

Dosimetry for all the PAGs was updated using the International Commission on Radiological Protection (ICRP) Publication 60 series (ICRP 1991a). The PAGs in this Manual are based on the calculations and tables contained in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manual (DOE 2010).

This update also lowers the recommended dose for administration of potassium iodide (KI) to children. FDA adopted this lower dose in 2001 based on studies of Chernobyl exposure data (FDA 2001 and FDA 2002).

The 1992 PAG Manual included placeholders anticipating the development of a drinking water PAG and cleanup guidance, but they are not included this update. Because EPA has established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act, the Agency defers to these standards to make decisions about protective actions for drinking water. EPA has not included late phase cleanup guidance in this Manual because it is outside the scope of the emergency response focus of this Manual, and existing state and federal cleanup programs are available for designing and implementing long-term cleanup following a radiological emergency (e.g., the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), which is implemented consistent with the National Contingency Plan and extensive EPA guidance).

1.4 Radiological Incident Phases and Applicability of Protective Actions

Emergency planners typically divide responses to radiological incidents into three time phases—

- **Early Phase**—The period beginning at the projected (or actual) initiation of a release and extending to a few days later, when deposition of airborne materials has ceased and sufficient information has become available to permit decisions about additional or longer term protection. This phase may last from hours to days.

- **Intermediate Phase**—The period beginning after the source and releases have been brought under control and environmental measurements are available for use as a basis for decisions on protective actions and extending until these protective actions are terminated. This phase may overlap the early phase and late phase and may last from weeks to months.

- **Late Phase**—The period beginning when recovery actions designed to reduce radiation levels in the environment to acceptable levels are commenced, and ending when all recovery actions have been completed. This phase may extend from months to years.

The phases cannot be represented by precise periods of time – and may even overlap – but can provide a useful framework for emergency response planning.

EPA PAGs and their associated protective actions are applicable for both the early and intermediate phases. The PAGs in this Manual apply to emergency responses and are not intended for late phase remediation and environmental restoration activities.

Sheltering-in-place and evacuation are the principal protective actions in the early phase. These actions are meant to avoid inhalation of gases or particulates in an atmospheric plume. Administration of prophylactic drugs may be employed depending on the specific radionuclides released; in particular, potassium iodide (KI)—also called “stable iodine”—may be administered as a supplementary protective action in incidents involving the release of radioactive iodine, such as nuclear power plant incidents. Some

protective actions may begin prior to release of radioactive material when there is advance notice.

Table A presents PAGs with their principal associated protective actions. In 2001, the PAG for administration of stable iodine was changed to 5 rem (50 millisieverts (mSv)) dose to child thyroid. It is assumed that recovery operations will have commenced within this period of time. All other PAGs and corresponding protective actions from the 1992 PAG Manual remain unchanged.

Recommended limits of exposure for emergency workers also remain unchanged from the 1992 PAG Manual. The OSHA annual limit for radiation dose is 5 rem (50 mSv). Responsible officials should use judgment when doses may exceed OSHA annual limits and must advise workers of the risks involved when doses approach 25 rem (250 mSv). There is no recommended dose limit for emergency workers performing life-saving activities. Further discussion of worker dose guidelines can be found in Chapter 2.

Table A. Protective Action Guides for Radiological Incidents

Phase	Protective Action Recommendation	Protective Action Guide
Early	Sheltering-in-place or evacuation of the public[a]	1 to 5 rem projected dose/4 days[b]
	Administration of prophylactic drugs - potassium iodide[c]	5 rem projected dose to child thyroid[d]
	Limit emergency worker exposure	5 rem/year (or greater under exceptional circumstances)[e]
Intermediate	Relocation of the public	2 rem projected dose first year[b] Subsequent years, 0.5rem/y projected dose Cumulative dose over 50 years, 5 rem
	Food interdiction[f]	0.5 rem/year projected dose, or 5 rem/year to any individual organ or tissue, whichever is limiting
	Limit emergency worker exposure	5 rem/year[b]

[a]Should normally begin at 1 rem; take whichever action (or combination of actions) that results in the lowest exposure for the majority of the population. Sheltering may begin at lower levels if advantageous.
[b]Total Effective Dose Equivalent (TEDE) - the projected sum of the effective dose equivalent from external radiation exposure (i.e., groundshine) and the committed effective dose equivalent from inhaled radioactive material.
[c]Provides thyroid protection from radioactive iodines only. For other information on radiological prophylactics and treatment, refer to www.fda.gov/cder/drugprepare/default.htm, www.bt.cdc.gov/radiation, or www.orau.gov/reacts.
[d]Committed Dose Equivalent (CDE). FDA understands that a KI administration program that sets different projected thyroid radioactive exposure thresholds for treatment of different population groups may be logistically impractical to implement during a radiological emergency. If emergency planners reach this conclusion, FDA recommends that KI be administered to both children and adults at the lowest intervention threshold (i.e., > 5 rem (50 mSv) projected internal thyroid exposure in children) (FDA 2001).
[e]In cases when radiation control options are not available, or, due to the magnitude of the incident, are not sufficient, doses to emergency workers above 5 rem (50 mSv) may be unavoidable and are generally approved by competent authority. For further discussion see Chapter 2, Section 2.7.4.
[f] For more information on food and animal feeds guidance, the complete FDA guidance may be found at http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM094513.pdf

1.4.1 Early Phase Protective Action Guides and Protective Actions

In the early phase, there are little or no data on actual releases to the environment, and responders may have to rely on crude estimates of airborne releases. Decision time frames are short and preparation is critical to make prudent decisions when data are lacking or insufficient.

The principal protective actions for the early phase are evacuation and sheltering-in-place. These protective actions would be taken at projected doses of 1 to 5 rem (10 to 50 mSv) TEDE over four days. The decision to evacuate must weigh the anticipated radiation dose to individuals in the affected population against the feasibility of evacuating within a determined time frame. For example, evacuating a population of 50,000 carries with it a statistical risk of injury or death from transportation hazards. Evacuation also takes time. In the case of an accident at a nuclear power plant, there may be sufficient time for an orderly and relatively safe evacuation. In the case of a fire or explosion of an RDD in an urban area, evacuating a large group of people could leave them exposed to the plume and actually increase radiation dose. Sheltering-in-

place may be warranted in situations where evacuation poses a greater risk of exposure or physical harm.

In addition, there are actions that are advisable, but not associated with a numerical PAG. For example, individuals should be instructed to cover airways (nose and mouth) with available filtering material when airborne radionuclides may be present. Decontamination is another protective action that may be utilized in the early phase and may include washing of contaminated individuals, removing contaminated clothing and decontaminating surfaces of critical areas and objects.

In cases where radioiodine may have been released, administration of the radioprotectant KI as a supplementary protective action should be considered if the committed dose equivalent exceeds 5 rem (50 mSv) to the child thyroid. This PAG is lower than the 1992 guidance. The lower dose, which FDA adopted in 2001, is for protection of children based on studies of Chernobyl exposure data.

The choice of protective action will be based on the status of the incident site and the prognosis for worsening conditions. In the early phase, precautionary actions based on worst-case scenarios may be used before implementation of protective actions based on PAGs. For example, in the case of RDD detonation, governments may instruct affected populations to shelter in place as a precautionary action while radiation levels are being measured to determine appropriate PAG-based protective actions. Officials should plan for rapid broadcast and dissemination of protective action orders to the public.

When available, predictions of radiological conditions in the environment based on an estimate of the source or actual environmental measurements may be used. Nuclear facilities, for example, have continuous, real-time radioactive effluent monitoring capabilities to monitor radioactive material released to the environment, and may have a network of offsite measurement stations.

1.4.2 Intermediate Phase Protective Action Guides and Protective Actions

Intermediate phase activities are intended to reduce or avoid dose to the public, to control worker exposures, to control the spread of radioactive contamination and to prepare for long-term cleanup operations.

During the intermediate phase, relocation, targeted environmental decontamination and focused cleanup are the principal protective actions against whole body external exposure from deposited material and from inhalation of radioactive particulate materials.

It is necessary to distinguish between evacuation and relocation. Evacuation is the urgent removal of people from an area to avoid or reduce high-level, short-term exposure, usually from the plume or deposited activity. Relocation is the removal or continued exclusion of people (households) from contaminated areas to avoid chronic radiation exposure. Site-specific conditions may allow some groups evacuated in an

emergency to return, while others may have to relocate. In other cases, some groups that were not previously evacuated may have to relocate.

Intermediate phase PAGs are based on doses projected in the first and subsequent years. The PAG for relocation of the public is 2 rem (20 mSv) in the first year, 0.5 rem (5 mSv) in any subsequent year, with cumulative dose over 50 years (including the first and second years) not exceeding 5 rem. (Note: This intermediate phase dose does not include ingestion of food and water). When projected doses are less than 2 rem, focused environmental decontamination and cleanup can reduce doses to populations that are not relocated. Decontamination and focused cleanup techniques can range from simple actions such as the scrubbing and flushing of surfaces to the removal and disposal of soil and contaminated debris.

Keeping below the 0.5 rem (5 mSv) PAG for out years – the second year and beyond – may be achieved through the decay of shorter half-life radioisotopes (as in the case of an accident at a nuclear power plant), through environmental decontamination and cleanup efforts or through other means of controlling public exposures, such as limiting access to certain areas. In the case of an RDD, in which a longer half-life radioisotope would likely be used, reductions in dose may prove difficult to achieve without full-scale site restoration. If projected cumulative dose over 50 years may exceed 5 rem, relocation should be considered.

Finally, during the intermediate phase, government officials may convene to discuss long-term cleanup and site restoration strategies. All actions taken during the early and intermediate phases should be considered with respect to the impact they may have on long-term remediation, such as avoiding the use of fixatives that could hinder surface decontamination at a later date.

1.4.3 Late Phase Standards

The late phase is the period beginning when recovery actions designed to reduce radiation levels in the environment to acceptable levels are commenced, and ending when all recovery actions have been completed. This phase ends upon completion of all recovery actions, and may extend from months to years. PAGs are not appropriate for the late phase, because existing state and federal cleanup programs are available for designing and implementing long-term cleanup.

1.4.4. Initial Implementation of Protective Action Guides and Protective Actions

Immediately upon becoming aware that an incident has occurred that may result in exposure of the population, responsible authorities should make a preliminary evaluation to determine the nature and potential magnitude of the incident. This evaluation should determine whether conditions indicate a significant possibility of a major release and, to the extent feasible, determine potential exposure pathways, populations at risk and projected doses. The incident evaluation and recommendations should then be presented to emergency response authorities for consideration and implementation.

The sequence of events during the early phase includes evaluation of conditions at the location of the incident, notification of responsible authorities, prediction or evaluation of potential consequences to the general public, recommendations for action and implementation of actions for the protection of the public.

In the intermediate phase, dose projections used to support protective actions decisions may be based on measurements of environmental radioactivity and dose models. When conditions warrant relocation of populations, the collection of extensive radiological and cost-of-cleanup data will be necessary to form the decision basis for recovery of the affected areas.

Protective actions may be already designated in existing emergency response plans. Under NRC regulations, commercial nuclear power plants must maintain detailed radiological response plans for an emergency planning zone (EPZ) within a 10 mile (16.1 km) radius of the plant and for a separate ingestion pathway EPZ within a 50 mile (80.5 km) radius. Emergency responders should be prepared to select and implement appropriate protective actions when standing response plans are not available or applicable.

KEY POINTS IN CHAPTER 1

- A protective action guide (PAG) is the projected dose to an individual from a release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended. PAGs are guides to help officials select protective actions under emergency conditions during which exposures would occur for relatively short time periods.
- EPA provides the Protective Action Guide (PAG) Manual to assist public officials with their radiological emergency response planning activities. The PAG Manual is a guidance document, not a legally binding regulation, and does not supersede any environmental laws. The PAG recommendations do not represent the boundary between safe and unsafe conditions.
- EPA issues PAGs under the authority granted it under the Reorganization Plan No. 3 of 1970, the Atomic Energy Act of 1946, as amended, and Executive Order 12656. The National Response Framework, Nuclear/Radiological Incident Annex of June 2008 also recognizes EPA's role in the development of PAGs.
- PAGs may be implemented to protect the public in a wide variety of radiological emergencies, including nuclear power plant accidents, transportation and space program accidents, and terrorist incidents.
- PAGs are appropriate for implementation in the early and intermediate phases of radiological incidents. The early phase—lasting days—is the period beginning at the projected (or actual) initiation of a release and ending when deposition of airborne materials has ceased. Little environmental data may be available in the early phase. The intermediate phase—lasting weeks to months—is the period beginning after the source and releases have been brought under control and environmental measurements are available for use as a basis for decisions on protective actions.

- ***What's new in this updated Manual—***
  - Dosimetry for all the PAGs has been updated using the International Commission on Radiological Protection (ICRP) Publication 60 series (ICRP 1991a). The PAGs in this Manual are implemented using the calculations and tables in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manual.
  - EPA has lowered the recommended dose for administration of potassium iodide (KI) as a supplementary protective action based on the FDA guidance issued in 2001, and adopted by DHS/FEMA in 2008.
  - EPA recommends that protective actions for drinking water be based on established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act (SDWA).
  - EPA refers public officials to available state and federal cleanup programs (e.g., CERCLA) for designing and implementing long-term cleanup following a radiological emergency.

Subject: Fw: SAN 5198 for OMB Submission --> Updates to Protective Action Guides Manual for Radiological Incidents; Notice (Tier 2, RIN NA2060)
To: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Jeffrey Blizzard/OU=DC/O=USEPA/C=US@EPA CN=Jessica Wieder/OU=DC/O=USEPA/C=US@EPA CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA
From: CN=Raymond Lee/OU=DC/O=USEPA/C=US
Submit Time: 5/25/2011 15:12:48

Hi all,

Just FYI - received an additional heads-up from Deb Banks. After we told her that Amit & the special assistants were expecting this package either COB today or tomorrow, she let the OPAR folks know and Rob will be doing a quick review for us so it'll get to Gina's office in short order.

Thanks again for everyone's help on this!

Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond@epa.gov

----- Forwarded by Raymond Lee/DC/USEPA/US on 05/25/2011 03:09 PM -----

From: Deborah Banks/DC/USEPA/US
To: Tom Eagles/DC/USEPA/US@EPA
Cc: Amit Srivastava/DC/USEPA/US@EPA, Julia Miller/DC/USEPA/US@EPA, John Millett/DC/USEPA/US@EPA, Nicole Owens/DC/USEPA/US@EPA, Philip Schwartz/DC/USEPA/US@EPA, Patricia Grim/DC/USEPA/US@EPA, Darryl Adams/DC/USEPA/US@EPA, Vickie Reed/DC/USEPA/US@EPA, Raymond Lee/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ruthw Morgan/DC/USEPA/US@EPA, Venu Ghanta/DC/USEPA/US@EPA
Date: 05/25/2011 03:02 PM
Subject: SAN 5198 for OMB Submission --> Updates to Protective Action Guides Manual for Radiological Incidents; Notice (Tier 2, RIN NA2060)

E-files attached. **Original** action delivered to OPAR this afternoon.

PAG Action Memo.docx PAG Action Memo.docx draft PAG Manual 5-24-2011.doc draft PAG Manual 5-24-2011.doc draft PAGs FR Notice 5-24-2011.doc draft PAGs FR Notice 5-24-2011.doc Gina Memo to OPEI.docx Gina Memo to OPEI.docx

05/25/2011 02:18 PM **SAN: 5198** **Tier: 2**

Protective Action Guidance for Radiological Incidents

Reviewers	Sign Off	Concur	Concur w/Comment	Non-Concur	Date
OPAR					
Special Assistant					
Don Zinger					
Janet G. McCabe					
Gina McCarthy					

Stage: **OMB Clearance Package**

Deadline:

"The purpose of the PAG Manual is to help federal, state, and local authorities make radiation protection decisions to protect the public during radiological emergencies. This *Federal Register* notice requests comments on specific aspects of the revised manual; however, comments on the entire revised manual are welcome."

ORIAContact: Sara DeCair, 202-343-9713

Subject: PAGs Comms Plan
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA CN=Nate McMichael/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Glenna Shields/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA CN=Raymond Lee/OU=DC/O=USEPA/C=US@EPA
From: CN=Jessica Wieder/OU=DC/O=USEPA/C=US
Submit Time: 6/16/2011 11:46:50

Sara, Darrell and Nate,

Please take a look at the updated comm's plan. I had to re-work the comm plan to meet the needs of the OAR communications office. At the end is a tentative timeline. I made it up with a little guidance from Darrell. Please let me know if I need to make changes (it is just a tentative timeline but it may be used to update Scout).

Thanks.

Comms Plan 6-16-2011.docx Comms Plan 6-16-2011.docx

Jess

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
w: (202) 343-9201
bb: (202) 420-9353

From: "Kylie Zirbel" <kzirbel@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA Darrell Liles/DC/USEPA/US@EPA
Subject: with glossary
Submit Time: 3/10/2011 17:11:24

Hi Sara,

Here is the manual with the glossary added. The file you sent ended up in my SPAM for some reason so I was delayed. Thank you!

Sincerely,

Kylie Zirbel | Analyst

P: 703.848.8842 x126

kzirbel@endyna.com

EnDyna, Inc.

7926 Jones Branch Drive.

Suite 620

McLean, VA 22102

www.endyna.com

DraftPAGManual EnDyna Version Clean 3-10-11.doc

Leaving this decision to you -

" I'd be happy to bring a sandwich to Room 509 so we could meet at 11:30 and still take a brief break before meeting with Susan Stahle and Ariadne.

Or may we include them in the earlier meeting with your program folks as well?"

Thank You,

Jeff Blizzard
Environmental Protection Agency
Office of Air and Radiation
Radiation Protection Division
Center for Radiological Emergency Management
(202) 343-9470

Cindy Anderson---02/03/2010 01:25:06 PM---Jeffrey - - I realized that I should've added comments to my response to your invite with my counter

From: Cindy Anderson/DC/USEPA/US

To: Jeffrey Blizzard/DC/USEPA/US@EPA

Cc: Sara DeCair/DC/USEPA/US@EPA

Date: 02/03/2010 01:25 PM

Subject: Thursday's meetings re PAGs

Jeffrey - -

I realized that I should've added comments to my response to your invite with my counter for 11:30-12:30.

I've not put on my calendar the training I'd planned to participate in most all the morning on that day, about writing regulations which I'm finally in the middle of on one of the proposed GHG rules (re CBI submissions as "emission data").

I'd be happy to bring a sandwich to Room 509 so we could meet at 11:30 and still take a brief break before meeting with Susan Stahle and Ariadne.

Or may we include them in the earlier meeting with your program folks as well?

thanks - -

Cindy Anderson
U.S. EPA
Office of General Counsel
(202) 564-2690

Subject: Re: see how you like this
To: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Submit Time: 3/11/2011 08:55:34
From:

Lee/Sara,

Just a few comments...

Thanks,

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

-----Lee Veal/DC/USEPA/US wrote: -----
To: Sara DeCair/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA
From: Lee Veal/DC/USEPA/US
Date: 03/10/2011 06:52PM
Subject: see how you like this

(See attached file: Reentry and Return draft 3-10-2011.docx)

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

[attachment "Reentry and Return draft 3-10-2011.docx" removed by Darrell Liles/DC/USEPA/US]**Reentry and Return draft 3-10-2011 -liles comments.docx**

Submit Time: 3/11/2011 23:37:26
Cc: siddhanti@endyna.com Darrell Liles/DC/USEPA/US@EPA Lee Veal/DC/USEPA/US@EPA
To: Sara DeCair/DC/USEPA/US@EPA
From: "Kylie Zirbel" <kzirbel@endyna.com>
Subject: Re: Finally -- Manual just needs a quick Kylie cleanup

Hi Sara,

Attached is the edited draft with the requested changes and some formatting. The only thing that is missing are the numbers for the addition to chapter 3. I was unsure about numbering it and whether or not this was done for a reason. I dropped the new glossary in, so this version should have everything we have worked on. Thank you!

sincerely,

Kylie Zirbel

-----Original Message-----
From: DeCair.Sara@epamail.epa.gov
Date: 03/11/2011 07:22 PM
To: kzirbel@endyna.com
CC: siddhanti@endyna.com, Liles.Darrell@epamail.epa.gov, Veal.Lee@epamail.epa.gov
Subject: Finally -- Manual just needs a quick Kylie cleanup

Kylie,

If I could figure out the TOC and formatting, you know I would finish it up! If you can take a quick go at cleaning it up, (and recall this one does NOT have the latest glossary, since we've crossed versions) --- I am eternally grateful, and very ready for this day to be over.....

Have a great weekend,

Sara Ex. 6 - Personal Privacy

(See attached file: DraftPAGManual Sara Markup Final 3-11-2011.doc)

DraftPAGManual for Interagency Review 3-10-11.doc

Subject: Fw: Re-entry paper and PAGs: ideas
To: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Mike Flynn/OU=DC/O=USEPA/C=US
Submit Time: 4/15/2011 16:34:57

fyi

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395
----- Forwarded by Mike Flynn/DC/USEPA/US on 04/15/2011 04:34 PM -----

From: Mike Flynn/DC/USEPA/US
To: Paul Anastas/DC/USEPA/US@EPA
Cc: Becky Fried/DC/USEPA/US@EPA
Date: 04/15/2011 11:07 AM
Subject: Fw: Re-entry paper and PAGs: ideas

Paul,
When you have a free moment, I'd like to give you a little background on the recent senior level nuclear exercises, the follow-up commitments (subject of yesterday's meeting w/Bob), and the various inter-agency groups we're working with on the follow-up and the PAG revisions. Think this will help us see how a new HHS/EPA group could fit into this structure, and help us advance our env/public health objectives here and elsewhere. Maybe we could find 30 mins early next week to run thru this with a few key people?

Mike

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395

-----Forwarded by Mike Flynn/DC/USEPA/US on 04/15/2011 10:58AM -----
To: Mike Flynn/DC/USEPA/US@EPA, Paul Anastas/DC/USEPA/US@EPA
From: Sara DeCair/DC/USEPA/US
Date: 04/14/2011 12:43PM
Cc: Lee Veal/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA
Subject: Re-entry paper and PAGs: ideas

Mike and Paul:

Alan is ready to send the Re-entry paper out this afternoon per our discussion with Bob this morning, but I am raising some related points below -- here is our proposed distro:

Principals:
EPA---Bob Perciasepe and Debbie Dietrich

DOE-- Steve Aoki
NRC-- Michael Weber
HHS-- Nicole Lurie
FEMA--- Craig Fugate

Drafting Team Members:

EPA
John Cardarelli (NDT)
Sara DeCair (ORIA)
Scott Hudson (NDT, also lead for Sub-IPC on IND clean-up)
Darrell Liles (ORIA)
Mark Mjoness (OEM)
Lisa Nanko (OHS)
Tom Peake (ORIA, included as a courtesy copy)
Alan Perrin (ORIA)
Earl Salo (OGC)
Jean Schumann (OEM)
Lee Veal (ORIA)
Jon Edwards (ORIA)

DOE
Daniel Blumenthal (NNSA)
David Bowman (NNSA)

NRC
Brian McDermott
Trish Milligan

HHS
Charles Miller (CDC)
Norm Coleman (NIH)
Michael A. Noska (FDA)

DHS
Tim Greten (FEMA)
Jim Kish (FEMA)
John Mackinney (Policy)

USDA
John T. Jensen

I'll be interested to learn from Paul what additional HHS organizations/people we should reach out to...

The PAGs Subcommittee includes both Charles Miller and Mike Noska, as well as other overlapping members with the above list:
To: <Andrew.Wallo@eh.doe.gov>, "'Ansari, Armin \(CDC/CCEHIP/NCEH\)'" <asa4@CDC.GOV>, <Carlos.Corredor@Hq.Doe.Gov>, "'Miller, Charles W. \(CDC/CCEHIP/NCEH\)'" <cym3@CDC.GOV>, Darrell Liles/DC/USEPA/US@EPA, <Edward.Regnier@hq.doe.gov>, <Ferris.John@dol.gov>, Helen Dawson/DC/USEPA/US@EPA, "'Jensen, JohnT'" <John.Jensen@dm.usda.gov>, "'MacKinney, John A'" <John.Mackinney@dhs.gov>, <kzirbel@endyna.com>, <lodwick.jeffrey@dol.gov>, "'Noska, Mike \(FDA\)'" <michael.noska@fda.hhs.gov>, <Patricia.Milligan@nrc.gov>, <ricardo.reyes@dtra.mil>, Samuel Hernandez/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA, "'Terry Kraus'" <tdkraus@sandia.gov>, "'Quinn, Vanessa'" <Vanessa.Quinn@dhs.gov>, Lee Veal/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, <william.cunningham@nist.gov>, Wynne Miller/DC/USEPA/US@EPA, Eric Burneson/DC/USEPA/US@EPA

Cc: Lee Veal/DC/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, "'Kylie Zirbel'" <kzirbel@endyna.com>

Ex. 5 - Deliberative Process

S.

From: "Kylie Zirbel" <kzirbel@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA Darrell Liles/DC/USEPA/US@EPA
Cc: <siddhanti@endyna.com>
Subject: revised PAGs manual draft
Submit Time: 4/14/2011 17:36:22

Hi Sara and Darrell,

I have attached the most recent draft of the PAGs manual with Darrell's revisions. This should now have the corrected footnote, along with any missing conversion factors. Please let me know if there is anything else you would like me to change or review.

Sincerely,

Kylie Zirbel | Analyst

P: 703.848.8842 x126

kzirbel@endyna.com

EnDyna, Inc.

7926 Jones Branch Drive.

Suite 620

McLean, VA 22102

www.endyna.com

DraftPAGManual for Interagency Review 4-14-11.doc

Correct

Ex. 5 - Deliberative Process

Lowell Ralston---03/31/2011 12:37:02 PM---Great! So what you're saying is: 1. For the First Year PAG: Terry calculated at DRL = 1.07E07 pCi

From: Lowell Ralston/DC/USEPA/US

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA

Date: 03/31/2011 12:37 PM

Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Great! So what you're saying is:

Ex. 5 - Deliberative Process

Nice.

Have you checked the I-131 triggers the same way, especially for milk?

Thanks,
Lowell

Ex. 5 - Deliberative Process

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/31/2011 01:23:24 PM---Comparison of results on our Cs-137 trigger table versus Terry's spreadsheet for the DRL for the fir

From: Scott Telofski/MTG/USEPA/US

To: Lowell Ralston/DC/USEPA/US@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA
Date: 03/31/2011 01:23 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Comparison of results on our Cs-137 trigger table versus Terry's spreadsheet for the DRL for the first and second years (comparison assumptions and results in red).

[attachment "Terry's Tables FIRST and SECOND YEAR.xls" deleted by Lowell Ralston/DC/USEPA/US]

Lowell Ralston---03/31/2011 12:14:26 PM---Quick question: I assuming your dose estimates are in units of mrem per pCi/m3. not just mrem, corr

From: Lowell Ralston/DC/USEPA/US

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA

Date: 03/31/2011 12:14 PM

Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Ex. 5 - Deliberative Process

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/31/2011 01:06:28 PM---Here is a spreadsheet. Data only need to be entered in "colored" fields (red, green or blue). Defa

From: Scott Telofski/MTG/USEPA/US
To: Lowell Ralston/DC/USEPA/US@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA
Date: 03/31/2011 01:06 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Here is a spreadsheet. Data only need to be entered in "colored" fields (red, green or blue). Default values are entered.

[attachment "Dose Calculation Spreadsheet.xlsx" deleted by Lowell Ralston/DC/USEPA/US]

Lowell Ralston---03/31/2011 05:02:10 AM---Scott, Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calc

From: Lowell Ralston/DC/USEPA/US

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA

Date: 03/31/2011 05:02 AM

Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Scott,

Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calculations and parameter values? A second pair of eyes always helps!

Lowell

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/30/2011 04:24:35 PM---Here is the table for Cs-137. Calculations are the same as those for I-131 particulates, with the e

From: Scott Telofski/MTG/USEPA/US
To: EOC Environmental Unit@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Lowell Ralston/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA
Date: 03/30/2011 04:24 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Ex. 5 - Deliberative Process

Not sure what we are doing about food/milk/water in the table, so I haven't done those. Let me know if we want them in and I will add them.

Ex. 5 - Deliberative Process

[attachment "Air Particulate Trigger Levels for Cs-137.docx" deleted by Lowell Ralston/DC/USEPA/US]

EOC Environmental Unit---03/30/2011 12:59:17 PM---Hi Scott: Jon Edwards has proactively requested a protective action guides table for Cs-137 similar

From: EOC Environmental Unit

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Lowell Ralston/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Ron Fraass/MTG/USEPA/US@EPA, Bonnie Gitlin/DC/USEPA/US@EPA

Date: 03/30/2011 12:59 PM

Subject: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Hi Scott:
Jon Edwards has proactively requested a protective action guides table for Cs-137 similar to the one you and others prepared for I-131 in the last several days. I understand you are the go to person to make this happen: -)

Please send us the Cs-137 PAG table by Noon EDT March 31 and let us know if you have questions.
Thank you!
Schatzi

Submit Time: 12/23/2009 13:05:33
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Wynne Miller/OU=DC/O=USEPA/C=US@EPA CN=David Huber/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Colby Stanton/OU=DC/O=USEPA/C=US@EPA CN=Thomas Agee/OU=DC/O=USEPA/C=US@EPA
Subject: Action items -- Drinking Water PAG discussion

Hi all;

Just in time to take off for vacation, I wanted to remind everyone about our action items before we meet on Jan. 12th. Let me know if I've gotten anything wrong!

OW:
- Confirm whether your office prefers an MCL multiple for a PAG, and if so, what that multiple might be
- Look at drinking water lab turnaround times to inform the implementation timeframe

ORIA:
- Find any educational material about the Food PAG (attached, it's a start)
- See how FDA might react to a combined Food/Water PAG

Note that we're talking to our AA on Jan. 6th about the PAGs, so hopefully we'll know a little more about her perspective when we meet. Have a great holiday week!

Sara

FDA_Food_PAGs.ppt FDA_Food_PAGs.ppt

Subject: pag comments
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Darrell Liles/OU=DC/O=USEPA/C=US
Submit Time: 3/8/2011 15:21:22

Sara,

Made some comments on nomenclature. Wanna discuss tomorrow?

PAGS Liles comments 3-8-11.doc PAGS Liles comments 3-8-11.doc

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Subject: Fw: exercise questions (Inside EPA)
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=William Steuteville/OU=R3/O=USEPA/C=US
Submit Time: 2/3/2010 13:20:05

Sara: See below, are the PAGs drafted last year applicable to LRE. I think that those PAGs are off the table for now, right? Need ASAP. thx

Bill Steuteville
USEPA III (3HS30)
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3264
Fax (215) 814-3254
----- Forwarded by William Steuteville/R3/USEPA/US on 02/03/2010 01:12 PM -----

From: Terri-A White/R3/USEPA/US

To: William Steuteville/R3/USEPA/US@EPA

Date: 02/03/2010 01:08 PM

Subject: Fw: exercise questions (Inside EPA)

Bill -- asking for clarification...
----- Forwarded by Terri-A White/R3/USEPA/US on 02/03/2010 01:08 PM -----

Doug Guarino <doug.guarino@iwpnews.com>

02/02/2010 05:22 PM

To
Terri-AWhite/R3/USEPA/US@
cc
Subject

E
P
A
cc

Subject

Terri,

Thanks for the response. I'm not sure however what you mean when you say "exercise players will consider all appropriate cleanup standards for all media in their cleanup planning." Which cleanup standards are considered appropriate? Will they be considering standards included in the new Protective Action Guidance (PAG) that EPA drafted last year (and if so, which ones?). Will they consider the Superfund Removal Action Levels (RALs)? Both? Neither? Any additional information you can provide me would be most helpful.

My deadline is Thursday.

Thanks again.

--
Douglas P. Guarino
Associate Editor
Inside Washington Publishers
(Inside EPA's Superfund Report)

1919 South Eads Street, Suite 201
Arlington, VA 22202
703-416-8518
fax:703-416-8543
mailto:dguarino@iwpnews.com

White.Terri-A@epamail.epa.gov wrote:
> Hi Doug,
>
> Here are answers to your question. We hope you'll consider coming to
> Philly to cover the exercise. We plan to hold a media briefing and tour
> on April 27; more info to come. -- Terri
>
> The exercise scenario is in the "post-emergency" phase (approximately 30
> to 90 days) of a radiological dirty bomb incident. The scenario
> envisions a dispersion of Cesium 137 over a very wide area (almost 50
> linear miles, 300 square miles). The largest concern for public health
> during this time frame in the scenario is surface concentrations of
> Cesium 137 in soil, pavement, buildings, cars, vegetation, etc., which
> contribute to the overall radiological dose/exposure to the public and
> response personnel. Exercise planners believe that response agencies,
> including EPA, would be concerned for reducing total radiation dose from
> all sources (air, water, soil, building, etc.) until final cleanup is
> achieved. Final cleanup of such an incident will take many years.
> Until final cleanup is achieved, response agencies would seek to reduce
> public dose/exposure through temporary and long-term relocation, interim
> mitigation and cleanup actions, and by planning long-term/final cleanup
> actions to address highest exposures first. Essentially, the purpose of
> exercise is to consider how response agencies will tackle these
> difficult issues.
>
> Generally, air concentrations will not be an issue for the exercise.
> The exercise planners believe that air concentrations in this time-frame
> would be low and have not developed the scenario to where air
> concentrations play a significant role in the exercise. Significant
> soil contamination is a predicted outcome of a radiological dirty bomb.
> Soil concentrations represent a significant factor for total
> radiological dose/exposure to the public and response personnel and are
> a concern for the exercise. Exercise planners have not specified soil
> cleanup standards. It is expected that exercise players will consider
> all appropriate cleanup standards for all media in their cleanup
> planning.
>
> In contrast, drinking water standards were considered by exercise
> planners because the safety of the public water supply is something that
> EPA, state and local officials would have ascertained and addressed in
> the emergency phase of the incident and the exercise planners developed
> the scenario accordingly. It is also true that exercise planners
> believe that the specific circumstances of the Liberty RadEx scenario
> and the water supply would not result in public drinking water supplies
> exceeding applicable drinking water standards.
>
>
>

> Doug Guarino
> <doug.guarino@iw
> pnews.com> To
> Terri-A White/R3/USEPA/US@EPA
> 01/19/2010 06:24 cc
> PM
> Subject
> Re: exercise questions
>
>
>
>
>
>
>
>
>
>
> Terri -- Thanks again for this -- it is very helpful. Can you tell me
> what standards the agency will use during the exercise for soil,
> buildings and air?
>
> --
> Douglas P. Guarino
> Associate Editor
> Inside Washington Publishers
> (Inside EPA's Superfund Report)
> 1919 South Eads Street, Suite 201
> Arlington, VA 22202
> 703-416-8518
> fax:703-416-8543
> mailto:dguarino@iwpnews.com
>
>
>
> Thanks again.
>
> White.Terri-A@epamail.epa.gov wrote:
>
>> Hi Doug,
>>
>> Here is background on Liberty RadEx and responses to your two
>>
> questions:
>
>> Liberty RadEx is a National Tier 2 (Federal-wide, DHS sanctioned)
>> radiological dispersion device (RDD) or "dirty bomb" exercise. It is
>>
> a
>
>> "post-emergency" exercise. A dirty bomb is a conventional
>> explosive--not a nuclear weapon--which is coupled with radioactive
>> material to cause widespread radiation contamination. Liberty RadEx
>>
> is
>

>> the first Tier 2 exercise sponsored by EPA. EPA has been planning the
>> exercise for over a year. It was proposed by EPA in 2008 and was
>> intended to address activities that are important to EPA and EPA's
>> National Response Framework hazardous substances responsibilities.
>>
> EPA
>
>> participates in almost all national exercises and we have many
>> responsibilities but they all boil down to protecting the public from
>> exposure to hazardous substances including, but not exclusively,
>> chemical, biological and radiological WMD agents. Most exercises deal
>> with the first few days of an incident. Although EPA would and does
>> respond in the first hours of an emergency and would begin critical
>> assessment and cleanup activities immediately, for a wide-spread
>> incident involving radiological contamination, the cleanup is only
>> really beginning in earnest after the first week. The cleanup would
>> take weeks, months or years depending on the size of the incident.
>> Liberty RadEx will address the post-emergency cleanup following a
>> notional RDD attack with Cesium-137 that has caused wide-spread
>> contamination over many miles. It will address how EPA, the State and
>> locals manage the assessment and cleanup, how we coordinate the
>>
> cleanup
>
>> with health agencies and others, and how we coordinate our activities
>> with all the other post-emergency response activities that would be
>> going on at the same time. The cleanup impacts all the other response
>> and recovery activities and other response and recovery activities
>> impact the cleanup. There will be approximately 20 other Federal
>> agencies involved in the exercise as well as the City of Philadelphia
>> Office of Emergency Management and Pennsylvania Department of
>> Environmental Protection. It is a complex exercise involving many
>> different issues.
>>
>> As for your question about recent terrorism incidents: The recent
>> attempt to detonate an explosive on an airplane does not impact the
>> Liberty RadEx scenario or activities.
>>
>> As to the water standard: The water standard we will use for Liberty
>> RadEx for Cesium 137 is the derived drinking water MCL which is 200
>> pCi/L, (picocuries per liter of water). This yields a dose of 4
>>
> mrem/yr
>
>> to the total body or any critical organ.
>>
>> Here is the page which references the Cesium 137 MCL:
>>
>> This page is from a Small Systems Radionuclide Compliance guide that
>>
> is
>
>> on our website:
>>
>>
> http://www.epa.gov/safewater/radionuclides/pdfs/guide_radionuclides_smallsystems_compliance.pdf

>
>
>> I hope this is helpful. -- Terri
>>
>> Terri A. White
>> Office of Public Affairs
>> EPA Region 3
>> 215-814-5523
>>
>>
>>
>>
>
>
>> Doug Guarino
>>
>
>
>> <doug.guarino@iw
>>
>
>
>> pnews.com>
>>
> To
>
>> Terri-A White/R3/USEPA/US@EPA
>>
>
>
>> 01/07/2010 11:54
>>
> cc
>
>> AM
>>
>
>
> Subject
>
>> exercise questions
>>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>

>>
>>
>> As discussed I wanted to chat on background about whether the recent
>> terrorism scare would have any impact on EPA's planned drills. I was
>> also curious as to what water standards would be used during the
>>
> drill.
>
>> No need to quote anybody.
>>
>> Thanks.
>>
>> --
>> Douglas P. Guarino
>> Associate Editor
>> Inside Washington Publishers
>> (Inside EPA's Superfund Report)
>> 1919 South Eads Street, Suite 201
>> Arlington, VA 22202
>> 703-416-8518
>> fax:703-416-8543
>> mailto:dguarino@iwpnews.com
>>
>>
>>
>>
>>
>>
>>
>>
>
>
>
>
>
>
>
>

Subject: Worker Safety in PAG Manual
To: Ferris.John@dol.gov
Cc: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
From: CN=Darrell Liles/OU=DC/O=USEPA/C=US
Submit Time: 1/6/2011 10:07:47

Hi John,

We are in the process of revising the 1992 PAG Manual. There are some sections that we would like to discuss with you (2.74 - 2.7.6). I've attached a draft copy.

Do you have time in the next couple of week? maybe next Tuesday or Wednesday afternoon?

DraftPAGManual12-10-2010.doc DraftPAGManual12-10-2010.doc

Thanks!

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Subject: Re: PAGs Comms Plan
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Jessica Wieder/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA CN=Glenna Shields/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA CN=Nate McMichael/OU=DC/O=USEPA/C=US@EPA CN=Raymond Lee/OU=DC/O=USEPA/C=US@EPA
Submit Time: 6/16/2011 15:54:12

Jess --

This looks good. I made some very minor tweaks in the attached version. Thank you!

Sara

-----Jessica Wieder/DC/USEPA/US wrote: -----
To: Sara DeCair/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, Nate McMichael/DC/USEPA/US@EPA
From: Jessica Wieder/DC/USEPA/US
Date: 06/16/2011 11:46AM
Cc: Glenna Shields/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA, Raymond Lee/DC/USEPA/US@EPA
Subject: PAGs Comms Plan

Sara, Darrell and Nate,

Please take a look at the updated comm's plan. I had to re-work the comm plan to meet the needs of the OAR communications office. At the end is a tentative timeline. I made it up with a little guidance from Darrell. Please let me know if I need to make changes (it is just a tentative timeline but it may be used to update Scout).

Thanks.

(See attached file: Comms Plan 6-16-2011.docx)

Jess

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
w: (202) 343-9201
bb: (202) 420-9353

[attachment "Comms Plan 6-16-2011.docx" removed by Sara DeCair/DC/USEPA/US]**Comms Plan 6-16-2011.docx**

Subject: cmts for real
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA
Cc:
Submit Time: 3/10/2011 10:44:47

PAGs Comment Sheet with Responses 3-10-2011.xlsx

Yes, please proceed. (Thanks for the update.) I'll cc Mike Flynn on this so he knows that we're continuing to move out on this and that we really can't delay until after the 23rd...Jon

Lee Veal---06/30/2010 11:11:57 AM---Jon, I have an update for you on the scheduling of this call between Dana and Beth George. It is sc

From: Lee Veal/DC/USEPA/US

To: Jonathan Edwards/DC/USEPA/US@EPA

Cc: Sara DeCair/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA

Date: 06/30/2010 11:11 AM

Subject: Re: Cancelled: PAGs Call With Beth G

Jon,

I have an update for you on the scheduling of this call between Dana and Beth George. It is scheduled for Friday, July 23 at 11am.

This is considerably later than we had hoped. Shall we proceed with scheduling the FRPCC meeting for the week of July 19 anyway?

Lee

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington DC, 20460
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Jonathan Edwards---06/29/2010 05:53:12 PM---Hi Mike---I learned from Lee Veal this afternoon that, due to BP Oil Spill response demands, Dana co

From: Jonathan Edwards/DC/USEPA/US

To: Mike Flynn/DC/USEPA/US@EPA

Cc: Perrin.Alan@epa.gov, Lee Veal/DC/USEPA/US@EPA

Date: 06/29/2010 05:53 PM

Subject: Cancelled: PAGs Call With Beth G

Hi Mike---I learned from Lee Veal this afternoon that, due to BP Oil Spill response demands, Dana couldn't make the 3pm call time today that had been set up to speak with Beth George/DHS on our PAGs

policy direction. And unfortunately, Beth G is leaving for holiday leave at 3:30pm today and isn't returning until Monday, July 12.

So we are shooting to talk with Beth (again coordinating with Dana Tulis) as soon as she is back in the office on the 12th. In the meantime, I think we should make contact with our DHS/rad folks and also see about trying to schedule the FRPCC/PAGs subcommittee for a time shortly after the 12th, when Dana can talk with Beth G. ---Jon

Submit Time: 12/21/2010 12:48:56
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: Newest Comms Plan with due dates

Lee --

These new dates are hoped for, what do you think?

Sara

Comms Plan 12-21-2010.doc Comms Plan 12-21-2010.doc

Sure thing. We're going to do a 2:00pm call to test using our webinar system (invite to come). Can you please try to register EPA Portal access? Here is the link

https://ssoprod.epa.gov/sso/jsp/oblogin.jsp

You can use Sara as your EPA contact. Under the main log-in section, there is a box with the option to request access to the Portal for EPA affiliates/business partners. The last portion of the sign-up page has a drop-down menu asking you to specify to which portion you seek access. I think you should choose "General Portal Access."

If you have an issue with the sign up, let me know!

Best,

Thomas Agee
Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933
Fax: (202)-343-2302

Melody Geer ---09/19/2011 11:14:08 AM---Thanks, Thomas. I already had a copy of the Worker Exposure example; just hadn't gotten that far in

From: Melody Geer <mgeer@trininc.com>
To: Thomas Agee/DC/USEPA/US@EPA
Cc: Sara DeCair/DC/USEPA/US@EPA
Date: 09/19/2011 11:14 AM
Subject: RE: draft training outlines and questions about Work assignment

---

Thanks, Thomas. I already had a copy of the Worker Exposure example; just hadn't gotten that far in the outline.

I will make the changes and flesh it out just a little more and send it back to y'all.

I am available on Wednesday afternoon for the webinar familiarization - just let me know when (and how!).

I am awaiting a review of the (initial) work plan by one person and will have it to Sara by this afternoon. We can make revisions after receiving the revised work assignment.

-----Original Message-----
From: Agee.Thomas@epamail.epa.gov [mailto:Agee.Thomas@epamail.epa.gov]
Sent: Monday, September 19, 2011 10:57 AM
To: Melody Geer
Cc: DeCair.Sara@epamail.epa.gov
Subject: RE: draft training outlines and questions about Work assignment

Melody, here are the suggested edits and answers to your questions that Sara and I discussed this morning. I've also attached the PAGs sample problems from an earlier mini-drill in case you wanted to see the emergency worker sample question.

(See attached file: Revised PAG Training Outline_9_19_2011_TA edits.docx)(See attached file:

Examples on PAGs Oct 2008.ppt)

-Will you be available for about 20-30 minutes sometime Wednesday afternoon to test your access to the EPA portal and webinar system?
(1ish/2ish)

-Val also tells me that the amended WA is still awaiting Contractor Office approval and should (maybe?) be in your hands by the end of the week. It's annoying how slow that office runs.

Best,

Thomas Agee
Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933
Fax: (202)-343-2302

From: Melody Geer <mgeer@trininc.com>
To: Sara DeCair/DC/USEPA/US@EPA
Cc: Thomas Agee/DC/USEPA/US@EPA
Date: 09/19/2011 10:32 AM
Subject: RE: draft training outlines and questions about Work assignment

Yes, I will be happy to draft an agenda for Thursday's call. I will try to have it to you by COB tomorrow. I look forward to getting the information from Thomas. I also have a draft of the EXCEL workbook almost ready to send to you.

Good idea to start on RadNet after that. I have someone that will be plowing through the RadNet website(s) later this week.

Melody

-----Original Message-----
From: DeCair.Sara@epamail.epa.gov [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Monday, September 19, 2011 10:27 AM
To: Melody Geer
Cc: Agee.Thomas@epamail.epa.gov
Subject: Re: draft training outlines and questions about Work assignment

Hi Melody!

Thomas will send you some updates, just minor additions and a plan to test EPA's webinar system with you this week to see if it works for our purposes.

I wonder if you could pull together an agenda for Thursday's team call with a run-through of the PAGs outline, and substantive material drafts that we have in hand already, to gauge the Team's feel for the material?

If you have other substantive ideas for our call, let us know, too.

Then maybe the next Team call could focus on RadNet, if that seems timely, and we can have a couple chats in between to flesh out those materials.

Thanks for letting me know if that sounds good,

Sara

From: Melody Geer <mgeer@trininc.com>
To: Sara DeCair/DC/USEPA/US@EPA, Thomas Agee/DC/USEPA/US@EPA
Date: 09/15/2011 05:02 PM
Subject: draft training outlines and questions about Work assignment

Sara: I am looking forward to our call tomorrow at 12:30 p.m. I especially need a number of questions answered about the work assignment so that I can finish the work plan and get it to you. I have attached my questions so that you will know what I need.

I have also attached a revision to the PAG training outline and the RadNet training outline. We need to talk about those also so that I can be heading in the correct direction on them.

I have started a workbook on the differences between the 92 PAG manual tables and the 2003 and 2010 FRMAC tables. We can talk about it tomorrow also.

Thanks!

Melody

Melody Geer

Trinity Engineering Associates

mgeer@trininc.com<mailto:mgeer@trininc.com>

724-473-0650

980-241-2724 (cell)
[attachment "Questions for Sara about WA 2 - Rev1.docx" deleted by Sara DeCair/DC/USEPA/US] [attachment "PAG training outline, rev 1.docx"
deleted by Sara DeCair/DC/USEPA/US] [attachment "RadNet training outline, rev 0.docx" deleted by Sara DeCair/DC/USEPA/US]

Subject: Fw: Division Meeting this Wednesday, June 30
To: Sara DeCair/DC/USEPA/US@EPA
Cc: Jessica Wieder/DC/USEPA/US@EPA
From: CN=Nate McMichael/OU=DC/O=USEPA/C=US
Submit Time: 6/29/2010 07:27:46

Do you need any help preparing for this? I didn't realize that the PAG manual was the theme.

Nate McMichael
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information and Outreach
Office: (202) 343-9265
Cell: (202) 236-4176

----- Forwarded by Nate McMichael/DC/USEPA/US on 06/29/2010 07:26 AM -----

From: Rafaela Ferguson/DC/USEPA/US

To: OAR-ORIA-RPD

Date: 06/28/2010 10:25 AM

Subject: Division Meeting this Wednesday, June 30

Good Morning All,

Just wanted to remind you that we have a Division meeting this Wednesday, June 30 from 10-10:30am in conference room 152. Topic: "Status of PAGs". See you there!

Rafie

Rafaela Ferguson
Special Assistant/Regional Coordinator
Radiation Protection Division (6608J)
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Voice: 202-343-9362
Fax: 202-343-2304
Email: ferguson.rafaela@epa.gov

Sara,

This looks good with the change for including the draft documents. What do you think about adding a couple of bullets that highlight our approach?

It is possible that this email will be distributed outside the usual committee members, so it might be good to spell out the acronyms.

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Sara DeCair---11/30/2010 11:27:10 AM---PAGs Subcommittee; Just a warning (!!) that we'll be sending you a draft Federal Register Notice for

From: Sara DeCair/DC/USEPA/US

To: Lee Veal/DC/USEPA/US@EPA

Date: 11/30/2010 11:27 AM

Subject: draft email -- plz review? PAGs Subcmte: Doc review and Conf Call

---

PAGs Subcommittee;

Just a warning (!!) that we'll be sending you a draft Federal Register Notice for Public Review and new, improved, streamlined PAGs Manual to review very soon. The new Manual has only 3 chapters: 1 (Overview), 2 (Early), and 3 (Intermediate). We'd like to get your feedback on the draft during the month of December.

We're proposing to incorporate the Food PAGs by reference to the FDA guidance, and also to refer the readers to the FRMAC Assessment Manuals (available online as of April) for calculation of DCFs, DRLs, and the tables themselves. This significantly reduces the length of the Manual (less than 50 pages total) and keeps the guidance more current as each of these pieces is updated in the future.

To discuss these proposals and areas in the PAGs that refer to your agency's mission or guidance, let's find a mutually agreeable time to meet in person (or phone) in the next couple weeks. Please tell me which of these times is NOT agreeable for you, via email, by this Friday, Dec. 3rd. Thank you for your support of this project!

Proposed meeting times:

Thurs., Dec. 9, 9:00 to 11:00 am
Thurs., Dec. 9, 1:00 to 3:00 pm
Thurs. Dec. 9, 2:30 to 4:30 pm
Tues., Dec. 14, 9:00 to 11:00 am
Tues., Dec. 14, 1:00 to 3:00 pm
Tues. Dec. 14, 2:30 to 4:30 pm

Sara

Sara D. DeCair, Health Physicist
www.epa.gov/radiation/rert/pags.html
Center for Radiological Emergency Management
U.S. Environmental Protection Agency
office (202) 343-9713
fax (202) 343-2304
decair.sara@epa.gov

Oops no! I have these additional responses done, in the Ch. 3 tab (hoped to do more this morning but it's looking unlikely). Many thanks!

S.

PAGs Comment responses 2-16-2011 1030 am.xlsx PAGs Comment responses 2-16-2011 1030 am.xlsx

"Kylie Zirbel" ---02/17/2011 09:14:43 AM---Hi Sara, Was this the only update that you needed to the comment sheet- it is the only thing I have

From: "Kylie Zirbel" <kzirbel@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 02/17/2011 09:14 AM
Subject: RE: Contaminated wash water language

Hi Sara,

Was this the only update that you needed to the comment sheet- it is the only thing I have received since the last one I sent. If so, I have attached the updated excel file for you. Let me know!

Sincerely,

Kylie Zirbel

-----Original Message-----
From: DeCair.Sara@epamail.epa.gov [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Thursday, February 17, 2011 8:45 AM
To: Kylie Zirbel
Subject: RE: Contaminated wash water language

Kylie -- sorry, here is a Word document so you can see it. We are not doing comment responses again today until 2 today so plenty of time to get me the next version (ha, no rest I tell you) -- thanks!!

Sara

(See attached file: Jean Schumann water comment.docx)

From: "Kylie Zirbel" <kzirbel@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 02/17/2011 08:36 AM
Subject: RE: Contaminated wash water language

Hi Sara,

Quick question about these comments. My outlook does not show anything in redline strikeout so if there is something that needs to be taken out, I cannot capture it in the excel file. Is there any way you can send me the comments in a word file? Let me know!

Thank you,

Sincerely,

Kylie Zirbel

-----Original Message-----
From: DeCair.Sara@epamail.epa.gov [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Wednesday, February 16, 2011 1:03 PM
To: kzirbel@endyna.com; siddhanti@endyna.com
Cc: Veal.Lee@epamail.epa.gov; Liles.Darrell@epamail.epa.gov
Subject: Fw: Contaminated wash water language

Not easy to put redline strikeout into an Excel comment matrix, but I know you can figure out a way to blend this in! I also have more responses to send you later today (then a new version for tomorrow?)
Many thanks,

Sara
----- Forwarded by Sara DeCair/DC/USEPA/US on 02/16/2011 01:01 PM -----

From: Jean Schumann/DC/USEPA/US
To: Sara DeCair/DC/USEPA/US@EPA
Cc: Wynne Miller/DC/USEPA/US@EPA, Samuel Hernandez/DC/USEPA/US@EPA
Date: 02/16/2011 10:35 AM
Subject: Contaminated wash water language

Sara,

I worked with OECA and OGC on the revisions below. I'm copying the OW reps that you had on your PAGs Subcommittee distribution list -- I don't know if OW has any input on this issue.

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Jean Schumann
Office of Emergency Management
U.S. Environmental Protection Agency
Phone: (202) 564-1977
schumann.jean@epa.gov

[attachment "PAGs Comments 2-17-2011.xlsx" deleted by Sara DeCair/DC/USEPA/US]

The BP spill response won't function if someone's away for 1.5 hours??

Thomas Agee
Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933
Fax: (202)-343-2302

Sara DeCair---06/30/2010 11:24:44 AM---Stay tuned.... delays.... ----- Forwarded by Sara DeCair/DC/USEPA/US on 06/30/2010 11:24 AM -----

From: Sara DeCair/DC/USEPA/US

To: Nate McMichael/DC/USEPA/US@EPA, Jessica Wieder/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, Thomas Agee/DC/USEPA/US@EPA

Date: 06/30/2010 11:24 AM

Subject: Fw: Cancelled: PAGs Call With Beth G

Stay tuned.... delays....
----- Forwarded by Sara DeCair/DC/USEPA/US on 06/30/2010 11:24 AM -----

From: Lee Veal/DC/USEPA/US

To: Jonathan Edwards/DC/USEPA/US@EPA

Cc: Sara DeCair/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA

Date: 06/30/2010 11:11 AM

Subject: Re: Cancelled: PAGs Call With Beth G

Jon,

I have an update for you on the scheduling of this call between Dana and Beth George. It is scheduled for Friday, July 23 at 11am.

This is considerably later than we had hoped. Shall we proceed with scheduling the FRPCC meeting for the week of July 19 anyway?

Lee

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington DC, 20460
Mail Code: 6608J

202-343-9448
cell 202-617-4322

Jonathan Edwards---06/29/2010 05:53:12 PM---Hi Mike---I learned from Lee Veal this afternoon that, due to BP Oil Spill response demands, Dana co

From: Jonathan Edwards/DC/USEPA/US

To: Mike Flynn/DC/USEPA/US@EPA

Cc: Perrin.Alan@epa.gov, Lee Veal/DC/USEPA/US@EPA

Date: 06/29/2010 05:53 PM

Subject: Cancelled: PAGs Call With Beth G

Hi Mike---I learned from Lee Veal this afternoon that, due to BP Oil Spill response demands, Dana couldn't make the 3pm call time today that had been set up to speak with Beth George/DHS on our PAGs policy direction. And unfortunately, Beth G is leaving for holiday leave at 3:30pm today and isn't returning until Monday, July 12.

So we are shooting to talk with Beth (again coordinating with Dana Tulis) as soon as she is back in the office on the 12th. In the meantime, I think we should make contact with our DHS/rad folks and also see about trying to schedule the FRPCC/PAGs subcommittee for a time shortly after the 12th, when Dana can talk with Beth G. ---Jon

FYI, I talked to Sue Stahle, she is going to send out a my bad note to the relevant OGC attorneys requesting written comments (preferably track change) to ORIA by Friday (or asap next week if necessary).
~~~~~~~~~~~~~~~~~~~~
Alan Perrin
Deputy Director, Radiation Protection Division
Office of Radiation and Indoor Air, USEPA
office: (202) 343-9775
mobile: (202) 279-0376
perrin.alan@epa.gov

Sara DeCair---09/01/2010 01:28:19 PM---Fyi, but there is a meeting invitation to discuss Epa's new dr water strategy for 9/13... Hm! ------

From: Sara DeCair/DC/USEPA/US

To: "Darrell Liles" <liles.darrell@epa.gov>, "Nate McMichael" <mcmichael.nate@epa.gov>, "Alan Perrin" <perrin.alan@epa.gov>, "Lee Veal" <veal.lee@epa.gov>

Date: 09/01/2010 01:28 PM

Subject: Fw: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice

---

Fyi, but there is a meeting invitation to discuss Epa's new dr water strategy for 9/13... Hm!

Sent by EPA Wireless E-Mail Services
Samuel Hernandez

----- Original Message -----
From: Samuel Hernandez
Sent: 09/01/2010 01:09 PM EDT
To: Sara DeCair
Subject: Re: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice
Hello,

This is to let you know that we do not have any comments and/or revisions on these two documents.

Thank You

Sam

==========
Samuel Hernández Quiñones
Environmental Engineer
Environmental Protection Agency
Office of Water
1200 Pennsylvania Ave. NW
Washington, DC 20460
202-564-1735

"USEPA Protecting Human Health and the Environment"

Sara DeCair---08/26/2010 03:53:56 PM---Just a quick reminder that I am looking for your feedback on the attached (very short!) documents by
~~~~~~~~~~~~~~~~~~~~

From: Sara DeCair/DC/USEPA/US

To: Jean Schumann/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Lisa Nanko/DC/USEPA/US@EPA, Samuel Hernandez/DC/USEPA/US@EPA

Cc: Mark Mjoness/DC/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA, Wynne Miller/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, Tony Nesky/DC/USEPA/US@EPA, Nate McMichael/DC/USEPA/US@EPA

Date: 08/26/2010 03:53 PM

Subject: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice

---

Just a quick reminder that I am looking for your feedback on the attached (very short!) documents by Monday. Thanks for letting me know right away if you are having trouble with anything, or if you would like for me to arrange a conference call for us to discuss the content. Thank you so much,

S.

Colleagues;

Attached are the opening chapter of the PAGs Manual, Chapter 1: Overview (actually this is a combination of the old Executive Summary and Chapter 1) and a draft of the Federal Register Notice. You'll see that both include statements -- that I've highlighted for your attention -- attempting to explain clearly what the new direction is.

The good news is, these two documents together are only 15 pages! So I hope it sounds reasonable to plan on providing me your comments by Monday, Aug. 30 (that's two full weeks). We probably will want to have a discussion about some of the language, so I'm glad to set up a conference call during the week of Aug. 23 or week of Aug. 30.

Thank you so much for your help! Write or call anytime if you have questions,

Sara
Sara D. DeCair, Health Physicist
www.epa.gov/radiation/rert/pags.html
Center for Radiological Emergency Management
U.S. Environmental Protection Agency
office (202) 343-9713
fax (202) 343-2304
decair.sara@epa.gov

[attachment "FR notice draft 8-13-2010.doc" deleted by Samuel Hernandez/DC/USEPA/US] [attachment "Chapter1PAGManual8-2-10.doc" deleted by Samuel Hernandez/DC/USEPA/US]

Subject: Re: Sorted comments/responses
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Thomas Agee/OU=DC/O=USEPA/C=US
Submit Time: 11/17/2009 18:02:41

Sara,

Please find attached the three excel spread sheets with all of the comments and responses sorted into 3 categories: 1) EPA Internal, 2) Interagency, and 3) State & Outside. Each workbook also has the original Master list of comments.

I think you may want to look at how I separated out the Water Ch. 4 Comment responses. I believe I was able to sort it correctly, but it was hard to tell where one set of comments began and others started. Also, it listed David Huber's comments as NRR Comments, but I put him under Internal EPA because he obviously works for OW. Know what that is about?

Let me know if you have questions/concerns. I will be at the EPA intern meeting from about 9:00-9:40ish, so I should be back before 10 and I can take the 10:20 shuttle over with you guys. If you want me to print the divided spreadsheets before we head over, let me know.

Master List Responses 3-9-2007.xls Master List Responses 3-9-2007.xls **Comment Master List 7.16.2007.xls** Comment Master List 7.16.2007.xls **PAG Water Ch 4 Comment responses 5-22-2006.xls** PAG Water Ch 4 Comment responses 5-22-2006.xls

Best,

Thomas Agee
Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933
Fax: (202)-343-2302

Bill -
The most relevant guidance is DHS RDD-IND published in 2008 - it has Optim process. RALs not so much since I think Liberty cleanup is not a Removal?
Jessica may be able to help put some better words to this!
Sara

Sent by EPA Wireless E-Mail Services
William Steuteville

----- Original Message -----
From: William Steuteville
Sent: 02/03/2010 01:20 PM EST
To: Sara DeCair
Subject: Fw: exercise questions (Inside EPA)

Sara: See below, are the PAGs drafted last year applicable to LRE. I think that those PAGs are off the table for now, right? Need ASAP. thx

Bill Steuteville
USEPA III (3HS30)
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3264
Fax (215) 814-3254

----- Forwarded by William Steuteville/R3/USEPA/US on 02/03/2010 01:12 PM -----

From: Terri-A White/R3/USEPA/US

To: William Steuteville/R3/USEPA/US@EPA

Date: 02/03/2010 01:08 PM

Subject: Fw: exercise questions (Inside EPA)

Bill -- asking for clarification...
----- Forwarded by Terri-A White/R3/USEPA/US on 02/03/2010 01:08 PM -----

Doug Guarino <doug.guarino@iwpnews.com>

02/02/2010 05:22 PM

To
Terri-A White/R3/U
cc
Subject

S
E
P
A
/
U
S
@
E
P
A
cc

Subject

Terri,

Thanks for the response. I'm not sure however what you mean when you say "exercise players will consider all appropriate cleanup standards for all media in their cleanup planning." Which cleanup standards are considered appropriate? Will they be considering standards included in the new Protective Action Guidance (PAG) that EPA drafted last year (and if so, which ones?). Will they consider the Superfund Removal Action Levels (RALs)? Both? Neither? Any additional information you can provide me would be most helpful.

My deadline is Thursday.

Thanks again.

--
Douglas P. Guarino
Associate Editor
Inside Washington Publishers
(Inside EPA's Superfund Report)
1919 South Eads Street, Suite 201
Arlington, VA 22202
703-416-8518
fax:703-416-8543
mailto:dguarino@iwpnews.com

White.Terri-A@epamail.epa.gov wrote:
> Hi Doug,
>
> Here are answers to your question. We hope you'll consider coming to
> Philly to cover the exercise. We plan to hold a media briefing and tour
> on April 27; more info to come. -- Terri
>
> The exercise scenario is in the "post-emergency" phase (approximately 30
> to 90 days) of a radiological dirty bomb incident. The scenario
> envisions a dispersion of Cesium 137 over a very wide area (almost 50
> linear miles, 300 square miles). The largest concern for public health
> during this time frame in the scenario is surface concentrations of
> Cesium 137 in soil, pavement, buildings, cars, vegetation, etc., which
> contribute to the overall radiological dose/exposure to the public and
> response personnel. Exercise planners believe that response agencies,
> including EPA, would be concerned for reducing total radiation dose from
> all sources (air, water, soil, building, etc.) until final cleanup is
> achieved. Final cleanup of such an incident will take many years.
> Until final cleanup is achieved, response agencies would seek to reduce
> public dose/exposure through temporary and long-term relocation, interim
> mitigation and cleanup actions, and by planning long-term/final cleanup
> actions to address highest exposures first. Essentially, the purpose of
> exercise is to consider how response agencies will tackle these
> difficult issues.
>
> Generally, air concentrations will not be an issue for the exercise.
> The exercise planners believe that air concentrations in this time-frame
> would be low and have not developed the scenario to where air
> concentrations play a significant role in the exercise. Significant
> soil contamination is a predicted outcome of a radiological dirty bomb.
> Soil concentrations represent a significant factor for total
> radiological dose/exposure to the public and response personnel and are
> a concern for the exercise. Exercise planners have not specified soil
> cleanup standards. It is expected that exercise players will consider
> all appropriate cleanup standards for all media in their cleanup
> planning.
>
> In contrast, drinking water standards were considered by exercise
> planners because the safety of the public water supply is something that
> EPA, state and local officials would have ascertained and addressed in

> the emergency phase of the incident and the exercise planners developed
> the scenario accordingly. It is also true that exercise planners
> believe that the specific circumstances of the Liberty RadEx scenario
> and the water supply would not result in public drinking water supplies
> exceeding applicable drinking water standards.
>
>
>
> Doug Guarino
> <doug.guarino@iw
> pnews.com> To
> Terri-A White/R3/USEPA/US@EPA
> 01/19/2010 06:24 cc
> PM
> Subject
> Re: exercise questions
>
>
>
>
>
>
>
>
>
>
> Terri -- Thanks again for this -- it is very helpful. Can you tell me
> what standards the agency will use during the exercise for soil,
> buildings and air?
>
> --
> Douglas P. Guarino
> Associate Editor
> Inside Washington Publishers
> (Inside EPA's Superfund Report)
> 1919 South Eads Street, Suite 201
> Arlington, VA 22202
> 703-416-8518
> fax:703-416-8543
> mailto:dguarino@iwpnews.com
>
>
>
> Thanks again.
>
> White.Terri-A@epamail.epa.gov wrote:
>
>> Hi Doug,
>>
>> Here is background on Liberty RadEx and responses to your two
>>
> questions:
>
>> Liberty RadEx is a National Tier 2 (Federal-wide, DHS sanctioned)
>> radiological dispersion device (RDD) or "dirty bomb" exercise. It is
>>

> a
>
>> "post-emergency" exercise. A dirty bomb is a conventional
>> explosive--not a nuclear weapon--which is coupled with radioactive
>> material to cause widespread radiation contamination. Liberty RadEx
>>
> is
>
>> the first Tier 2 exercise sponsored by EPA. EPA has been planning the
>> exercise for over a year. It was proposed by EPA in 2008 and was
>> intended to address activities that are important to EPA and EPA's
>> National Response Framework hazardous substances responsibilities.
>>
> EPA
>
>> participates in almost all national exercises and we have many
>> responsibilities but they all boil down to protecting the public from
>> exposure to hazardous substances including, but not exclusively,
>> chemical, biological and radiological WMD agents. Most exercises deal
>> with the first few days of an incident. Although EPA would and does
>> respond in the first hours of an emergency and would begin critical
>> assessment and cleanup activities immediately, for a wide-spread
>> incident involving radiological contamination, the cleanup is only
>> really beginning in earnest after the first week. The cleanup would
>> take weeks, months or years depending on the size of the incident.
>> Liberty RadEx will address the post-emergency cleanup following a
>> notional RDD attack with Cesium-137 that has caused wide-spread
>> contamination over many miles. It will address how EPA, the State and
>> locals manage the assessment and cleanup, how we coordinate the
>>
> cleanup
>
>> with health agencies and others, and how we coordinate our activities
>> with all the other post-emergency response activities that would be
>> going on at the same time. The cleanup impacts all the other response
>> and recovery activities and other response and recovery activities
>> impact the cleanup. There will be approximately 20 other Federal
>> agencies involved in the exercise as well as the City of Philadelphia
>> Office of Emergency Management and Pennsylvania Department of
>> Environmental Protection. It is a complex exercise involving many
>> different issues.
>>
>> As for your question about recent terrorism incidents: The recent
>> attempt to detonate an explosive on an airplane does not impact the
>> Liberty RadEx scenario or activities.
>>
>> As to the water standard: The water standard we will use for Liberty
>> RadEx for Cesium 137 is the derived drinking water MCL which is 200
>> pCi/L, (picocuries per liter of water). This yields a dose of 4
>>
> mrem/yr
>
>> to the total body or any critical organ.
>>
>> Here is the page which references the Cesium 137 MCL:
>>

>> This page is from a Small Systems Radionuclide Compliance guide that
>>
> is
>
>> on our website:
>>
>>
> http://www.epa.gov/safewater/radionuclides/pdfs/guide_radionuclides_smallsystems_compliance.pdf
>
>
>> I hope this is helpful. -- Terri
>>
>> Terri A. White
>> Office of Public Affairs
>> EPA Region 3
>> 215-814-5523
>>
>>
>>
>>
>
>
>> Doug Guarino
>>
>
>
>> <doug.guarino@iw
>>
>
>
>> pnews.com>
>>
> To
>
>> Terri-A White/R3/USEPA/US@EPA
>>
>
>
>> 01/07/2010 11:54
>>
> cc
>
>> AM
>>
>
>
> Subject
>
>> exercise questions
>>
>
>
>
>
>
>

>
>
>
>
>
>
>
>
>>
>>
>> As discussed I wanted to chat on background about whether the recent
>> terrorism scare would have any impact on EPA's planned drills. I was
>> also curious as to what water standards would be used during the
>>
> drill.
>
>> No need to quote anybody.
>>
>> Thanks.
>>
>> --
>> Douglas P. Guarino
>> Associate Editor
>> Inside Washington Publishers
>> (Inside EPA's Superfund Report)
>> 1919 South Eads Street, Suite 201
>> Arlington, VA 22202
>> 703-416-8518
>> fax:703-416-8543
>> mailto:dguarino@iwpnews.com
>>
>>
>>
>>
>>
>>
>>
>>
>
>
>
>
>
>
>
>

I called Sam and asked for something in writing.
The 9/13 meeting was initiated by Jon E based on having new OW folks, and wanting to talk about some recent traffic on their policies regarding radiation levels.

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington DC, 20460
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Sara DeCair---09/01/2010 01:28:19 PM---Fyi, but there is a meeting invitation to discuss Epa's new dr water strategy for 9/13... Hm! ------

From: Sara DeCair/DC/USEPA/US

To: "Darrell Liles" <liles.darrell@epa.gov>, "Nate McMichael" <mcmichael.nate@epa.gov>, "Alan Perrin" <perrin.alan@epa.gov>, "Lee Veal" <veal.lee@epa.gov>

Date: 09/01/2010 01:28 PM

Subject: Fw: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice

---

Fyi, but there is a meeting invitation to discuss Epa's new dr water strategy for 9/13... Hm!

Sent by EPA Wireless E-Mail Services
Samuel Hernandez

----- Original Message -----
From: Samuel Hernandez
Sent: 09/01/2010 01:09 PM EDT
To: Sara DeCair
Subject: Re: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice
Hello,

This is to let you know that we do not have any comments and/or revisions on these two documents.

Thank You

Sam

==========
Samuel Hernández Quiñones
Environmental Engineer
Environmental Protection Agency
Office of Water
1200 Pennsylvania Ave. NW
Washington, DC 20460
202-564-1735

"USEPA Protecting Human Health and the Environment"

Sara DeCair---08/26/2010 03:53:56 PM---Just a quick reminder that I am looking for your feedback on the attached (very short!) documents by

From: Sara DeCair/DC/USEPA/US

To: Jean Schumann/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Lisa Nanko/DC/USEPA/US@EPA, Samuel Hernandez/DC/USEPA/US@EPA

Cc: Mark Mjoness/DC/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA, Wynne Miller/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, Tony Nesky/DC/USEPA/US@EPA, Nate McMichael/DC/USEPA/US@EPA

Date: 08/26/2010 03:53 PM

Subject: Reminder: Review by Aug. 30: PAGs Ch. 1 and FR Notice

---

Just a quick reminder that I am looking for your feedback on the attached (very short!) documents by Monday. Thanks for letting me know right away if you are having trouble with anything, or if you would like for me to arrange a conference call for us to discuss the content. Thank you so much,

S.

Colleagues;

Attached are the opening chapter of the PAGs Manual, Chapter 1: Overview (actually this is a combination of the old Executive Summary and Chapter 1) and a draft of the Federal Register Notice. You'll see that both include statements -- that I've highlighted for your attention -- attempting to explain clearly what the new direction is.

The good news is, these two documents together are only 15 pages! So I hope it sounds reasonable to plan on providing me your comments by Monday, Aug. 30 (that's two full weeks). We probably will want to have a discussion about some of the language, so I'm glad to set up a conference call during the week of Aug. 23 or week of Aug. 30.

Thank you so much for your help! Write or call anytime if you have questions,

Sara
Sara D. DeCair, Health Physicist
www.epa.gov/radiation/rert/pags.html
Center for Radiological Emergency Management
U.S. Environmental Protection Agency
office (202) 343-9713
fax (202) 343-2304
decair.sara@epa.gov

[attachment "FR notice draft 8-13-2010.doc" deleted by Samuel Hernandez/DC/USEPA/US] [attachment "Chapter1PAGManual8-2-10.doc" deleted by Samuel Hernandez/DC/USEPA/US]

Subject: Draft PAGs Markey Response
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Nate McMichael/OU=DC/O=USEPA/C=US@EPA CN=Thomas Agee/OU=DC/O=USEPA/C=US@EPA
From: CN=Jessica Wieder/OU=DC/O=USEPA/C=US
Submit Time: 11/3/2009 11:35:58

Sara - This is what the three of us came up with. Please pass this along or let me know who else you would like to review it at this point.

Jess

MARKEY CONTROL RESPONSE 11-3-2009.doc MARKEY CONTROL RESPONSE 11-3-2009.doc

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

Submit Time: 5/7/2010 16:15:56
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Jessica Wieder/OU=DC/O=USEPA/C=US@EPA "Taylor, Tammy P."
Ex. 6 - Personal Privacy alvin.potter@orise.orau.gov
Cc:
Subject: IND cmt responses for Ch. 3

I got through almost all of the Chapter 3 comments, you will find my suggestions in the attached, page # sorted version of the spreadsheet. I will be checking emails on my blackberry next week so let me know if you need something, but don't expect me to study attachments!! :-)

S.

IND cmts table Sara Chapter 3 responses.xls IND cmts table Sara Chapter 3 responses.xls

Subject: Fw: Followup to our last meeting
From: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US
To: CN=Mike Flynn/OU=DC/O=USEPA/C=US@EPA CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Tom Peake/OU=DC/O=USEPA/C=US@EPA CN=Daniel Schultheisz/OU=DC/O=USEPA/C=US@EPA
Cc:
Submit Time: 5/19/2011 22:09:13

FYI

-----Forwarded by Jonathan Edwards/DC/USEPA/US on 05/19/2011 10:08PM -----
To: Debbie Dietrich/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA
From: Bob Perciasepe/DC/USEPA/US
Date: 05/19/2011 08:14PM
Subject: Fw: Followup to our last meeting

for tomorrw

Bob Perciasepe
Deputy Administrator

(o) +1 202 564 4711
(c) +1 202 368 8193

----- Forwarded by Bob Perciasepe/DC/USEPA/US on 05/19/2011 08:13 PM -----

From: "Virgilio, Martin" <Martin.Virgilio@nrc.gov>
To: Bob Perciasepe/DC/USEPA/US@EPA
Cc: "'Dabney_R_Kern Ex. 6 - Personal Privacy <Dabney_R_Kern Ex. 6 - Personal Privacy
Date: 05/19/2011 06:39 PM
Subject: Followup to our last meeting

Bob

In an effort to keep up the momentum around the issues we have been discussing regarding the long-term cleanup standard, we have developed the attached document for your consideration. We have summarized the outcomes of the May 9th meeting, acknowledged the role of CERCLA, offered some additional views on optimization and provided comments on the Table you presented at the meeting.

What do you see as the next steps in the process of developing a revised proposal?

Marty

*(See attached file: email followup to EPA (4).docx)***email followup to EPA (4).docx**

Just kidding - here is a new spreadsheet with FR Notice responses done too -- sorry!

S.

-----Darrell Liles/DC/USEPA/US wrote: -----

To: "Kylie Zirbel" <kzirbel@endyna.com>
From: Darrell Liles/DC/USEPA/US
Date: 02/22/2011 05:16PM
Cc: Sara DeCair/DC/USEPA/US@EPA, "siddhanti" <siddhanti@endyna.com>, "veal lee" <veal.lee@epa.gov>
Subject: PAG Comment Responses

Kylie,

I've attached the latest comment responses. Only chapter 1 and chap 2 should be new to your spreadsheet.

Sara,

Let me know which comments you get through tonight so we are not duplicating efforts! I can't work on these tonight but would be glad to tomorrow evening and Thursday.

Thanks!
Darrell

[attachment "Copy of PAGs Comments 2-22-2011 3 PM Liles.xlsx" removed by Sara DeCair/DC/USEPA/US]

PAGs Comment Responses 2-22-2011 630 PM.xlsx

Sara.

We need to discuss the change in 2.3.5

I just talked to Ed and we realized why I was struggling with the meaning of the sentence below. The sentence following it was removed so it loses context.

Ex. 5 - Deliberative Process

-Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Sara DeCair---03/09/2011 01:33:47 PM---How about an attachment with that? _____

From: Sara DeCair/DC/USEPA/US
To: kzirbel@endyna.com
Cc: Darrell Liles/DC/USEPA/US@EPA
Date: 03/09/2011 01:33 PM
Subject: PAGs nomenclature conclusions

How about an attachment with that?

PAGS Liles comments Sara-approved 3-9-2011.doc PAGS Liles comments Sara-approved 3-9-2011.doc

_____

Kylie,

If you skim through this marked up version, you'll see three places where Darrell made nomenclature suggestions and I just reviewed them -- let me know if there is anything fuzzy about it. Many thanks!!

Sara

Submit Time: 11/23/2010 09:44:52
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Tony Nesky/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: Fw: ch 3

Thank you Tony!
----- Forwarded by Sara DeCair/DC/USEPA/US on 11/23/2010 09:44 AM -----

From: Alan Perrin/DC/USEPA/US

To: Sara DeCair/DC/USEPA/US@EPA

Date: 11/16/2010 06:37 PM

Subject: ch 3

I handed written cmmts on Ch2, here is Ch3. Again, not too much from my end - nice job on everyone's part getting this ready for the interagency. **Ex. 5 - Deliberative Process**

Ex. 5 - Deliberative Process

ch3_11-16-10_adp.doc ch3_11-16-10_adp.doc
~~~~~~~~~~~~~~~~~~~~
Alan Perrin
Deputy Director, Radiation Protection Division
Office of Radiation and Indoor Air, USEPA
office: (202) 343-9775
mobile: (202) 279-0376
perrin.alan@epa.gov
~~~~~~~~~~~~~~~~~~~~

Subject: Fw: Update on PAGs
To: CN=Beth Craig/OU=DC/O=USEPA/C=US@EPA CN=Mike Flynn/OU=DC/O=USEPA/C=US@EPA CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Mike Boyd/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Glenna Shields/OU=DC/O=USEPA/C=US@EPA
From: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US
Submit Time: 3/31/2010 10:32:45

Good news...Congressman Markey's staff seems pleased with the latest. ---Jon

----- Forwarded by Jonathan Edwards/DC/USEPA/US on 03/31/2010 10:30 AM -----

From: Diann Frantz/DC/USEPA/US

To: Jonathan Edwards/DC/USEPA/US@EPA

Date: 03/31/2010 09:09 AM

Subject: Fw: Update on PAGs

Jon

Thanks for doing the update for Michal. She seems pleased.

----- Forwarded by Diann Frantz/DC/USEPA/US on 03/31/2010 09:07 AM -----

From: "Freedhoff, Michal" <Michal.Freedhoff@mail.house.gov>

To: Diann Frantz/DC/USEPA/US@EPA

Date: 03/31/2010 07:57 AM

Subject: Re: Update on PAGs

Thank you (and him) very much for the note. We really appreciate being kept up to date. We'll look forward to hearing more in a month or so.

Michal
Michal Ilana Freedhoff, Ph.D.
Policy Director
Office of Representative Edward J. Markey
2108 Rayburn House Office Building
Washington, DC 20515
202-225-2836

Sent using BlackBerry

----- Original Message -----
From: Frantz.Diann@epamail.epa.gov <Frantz.Diann@epamail.epa.gov>
To: Freedhoff, Michal
Sent: Tue Mar 30 18:22:57 2010

Subject: Update on PAGs

Michal,

Below is a note from the Jon Edwards,Director of the Radiation Division, updating you on and issue you expressed and interest in during our meeting in January. If you have questions please let me know.

Diann
564-3668

****
Dear Dr. Freedhoff:

Thanks again to you and Dr. Joseph for coming to EPA's Office of Air and Radiation (OAR) on January 28 to meet with us. We believe the meeting was constructive and laid the foundation for productive interactions between us as we move forward with our regulatory and guidance initiatives in OAR's Radiation Protection Division. I am writing today to give you a progress report on an issue you raised of particular concern to Congressman Markey, the Protective Action Guides (PAGs). Recall that at the time of our meeting we thought we could have an Assistant Administrator-level meeting on PAGs in March.

We are making progress - though getting all the appropriate Assistant Administrators together for a meeting has proven a bit more challenging than we had hoped. It now looks like we will have that meeting in April. Once our senior leadership has arrived at a consensus position, we will need to engage with the larger stakeholder community and the interagency work group to determine a path forward.

We will get back to you at the end of April with an update on how things are progressing. If you have any questions, please contact Diann Frantz in the Office of Congressional and Intergovernmental Relations at 202.564.3668.

Sincerely,

Jonathan Edwards, Director
Radiation Protection Division

50 year PA 50 year PAG question.docFAQ's (half) with Sara remarks7-21-

FAQ's (half) with Sara remarks7-21-08.docFAQs All May

FAQs All May 2009.docMike's Frequently Asked Questions sdd

markup.doc Mike's Frequently Asked Questions sdd markup.docMore

FAQ ideas.docx More FAQ ideas.docxPart 2 of Mike's FAQs.doc Part 2 of Mike's FAQs.doc

Hi Smita,

I should have the rest of Chap 1 comments done by noon today and will send you another version. I've attached the file from yesterday (Chap 1 is all that is new).

What is the status of the documents that you are working on? Will we be able to send it out by noon tomorrow as promised?

Copy of PAGs Comments 2-23-2011 3 PM Liles.xlsx Copy of PAGs Comments 2-23-2011 3 PM Liles.xlsx

Thanks!

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Sara,

Yes, don't worry. We know you're in the EOC. More than likely Jon or Alan will do the talking. Thanks.

Rafie

Rafaela Ferguson
Special Assistant/Regional Coordinator
Radiation Protection Division (6608J)
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Voice: 202-343-9362
Fax: 202-343-2304
Email: ferguson.rafaela@epa.gov

Sara DeCair---06/28/2010 10:59:06 AM---Oops - are we cool with me missing this? I am scheduled to work in the EOC as Planning Support! I ma

From: Sara DeCair/DC/USEPA/US

To: Rafaela Ferguson/DC/USEPA/US@EPA

Date: 06/28/2010 10:59 AM

Subject: Re: Division Meeting this Wednesday, June 30

Oops - are we cool with me missing this? I am scheduled to work in the EOC as Planning Support! I may have flubbed, and forgot to put this on my calendar. Certainly Alan can tell the story....

Rafaela Ferguson---06/28/2010 10:25:55 AM---Good Morning All, Just wanted to remind you that we have a Division meeting this Wednesday, June 30

From: Rafaela Ferguson/DC/USEPA/US

To: OAR-ORIA-RPD

Date: 06/28/2010 10:25 AM

Subject: Division Meeting this Wednesday, June 30

Good Morning All,

Just wanted to remind you that we have a Division meeting this Wednesday, June 30 from 10-10:30am in conference room 152. Topic: "Status of PAGs". See you there!

Rafie

Rafaela Ferguson
Special Assistant/Regional Coordinator
Radiation Protection Division (6608J)

Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Voice: 202-343-9362
Fax: 202-343-2304
Email: ferguson.rafaela@epa.gov

Liberty RadEx? PAGs also of course, I like to act like they're about to get issued :)

Colby Stanton---11/24/2009 12:52:05 PM---Anyone have anything? The only thing I could think of was PAGs, which I'm asking Jon whether we wan

From: Colby Stanton/DC/USEPA/US

To: OAR-ORIA-RPD-CREM

Date: 11/24/2009 12:52 PM

Subject: Fw: QUICK TURNAROUND ASSIGNMENT -- DUE by Noon, Monday November 30

Anyone have anything? The only thing I could think of was PAGs, which I'm asking Jon whether we want to include....
----- Forwarded by Colby Stanton/DC/USEPA/US on 11/24/2009 12:51 PM -----

From: Rafaela Ferguson/DC/USEPA/US

To: Tom Peake/DC/USEPA/US@EPA, Glenna Shields/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, Jerome Puskin/DC/USEPA/US@EPA

Cc: Mike Boyd/DC/USEPA/US@EPA

Date: 11/24/2009 12:40 PM

Subject: QUICK TURNAROUND ASSIGNMENT -- DUE by Noon, Monday November 30

Hi Everyone --

The Administrator's Office is preparing a document for the White House on "big deal" items that will happen in FY 2010. OAR wants input from all of its program offices indicating things like expected date of proposed rules, expected date of final rules, and any other "big deal" action, document, or items in FY 2010. They are looking for a one to two sentence description for each item explaining the action and any other relevant information.

Please send any items you have to me by 10:00 am Monday, November 30. I will get them to Jon for review and approval so we can submit RPD's to Dennis O'Connor by noon.

Thanks.

Rafie

Rafaela Ferguson
Special Assistant/Regional Coordinator
Radiation Protection Division (6608J)
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Voice: 202-343-9362
Fax: 202-343-2304
Email: ferguson.rafaela@epa.gov

Goodie! Thank you... I am at Argonne starting my day of talks + meetings - whee!!

Sent by EPA Wireless E-Mail Services
Lee Veal

----- Original Message -----
From: Lee Veal
Sent: 02/24/2011 10:24 AM EST
To: Sara DeCair
Cc: Darrell Liles
Subject: Re: Fw: Invitation: PAGs Subcommittee Meeting (Feb 28 09:00 AM EST in 1310L Room 509/DC-1310L-OAR@EPA)
We had a good call with Pam Barr, Lisa Crist? And Eric from OW. They appreciated Mike reaching out too.

OW is doing some homework in preparation. They will be prepared to discuss how we have handled other very large scale incidents and used our SDWA requirements. Sample would be Katrina. I feel pretty good about them for Monday and beyond.

LV
Lee B. Veal
Director, Center for Radiological Emergency Response
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322
Sara DeCair

----- Original Message -----
From: Sara DeCair
Sent: 02/24/2011 09:06 AM EST
To: Lee Veal
Cc: Darrell Liles
Subject: Re: Fw: Invitation: PAGs Subcommittee Meeting (Feb 28 09:00 AM EST in 1310L Room 509/DC-1310L-OAR@EPA)
No - just not invested in the rest of it. It is bound to be a long topic, but only so much that discussing will do...

Sent by EPA Wireless E-Mail Services
Lee Veal

----- Original Message -----
From: Lee Veal
Sent: 02/24/2011 09:04 AM EST
To: Sara DeCair
Cc: Darrell Liles
Subject: Re: Fw: Invitation: PAGs Subcommittee Meeting (Feb 28 09:00 AM EST in 1310L Room 509/DC-1310L-OAR@EPA)
Are they folks who would walk out right at noon if we needed them to say 12:30?

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency

1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Sara DeCair---02/24/2011 08:58:13 AM---Yepper it's their hour :) ----------

From: Sara DeCair/DC/USEPA/US
To: Darrell Liles/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA
Date: 02/24/2011 08:58 AM
Subject: Re: Fw: Invitation: PAGs Subcommittee Meeting (Feb 28 09:00 AM EST in 1310L Room 509/DC-1310L-OAR@EPA)

Yepper it's their hour :)

Sent by EPA Wireless E-Mail Services

Darrell Liles

----- Original Message -----
From: Darrell Liles
Sent: 02/24/2011 08:56 AM EST
To: Lee Veal; Sara DeCair
Subject: Re: Fw: Invitation: PAGs Subcommittee Meeting (Feb 28 09:00 AM EST in 1310L Room 509/DC-1310L-OAR@EPA)
Lee/Sara,

I need to reply back to Wynne. I want to make sure before I send it that we only need OW people from 11 to noon

Draft email to Wynne Miller

Wynne,

The water issues are scheduled to be discussed from 11 to noon so we do need OW people then. That said OW people are welcome to attend the entire meeting. We know time is precious so the meeting was scheduled to allow flexibility to attend at specific times

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Wynne Miller---02/24/2011 08:42:27 AM---Hi Darrell, I received the following invite this morning to attend the Feb 28th PAGS meeting from 9-

See my comments in red.

Sara DeCair---06/09/2011 12:10:08 PM---Sorry, I had one more thought! I am sure that not all my PAGs propaganda below needs to be kept, but

From: Sara DeCair/DC/USEPA/US
To: Daniel Schultheisz/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA
Date: 06/09/2011 12:10 PM
Subject: USE THIS ONE: draft Note from Debbie to Bob?

Sorry, I had one more thought! I am sure that not all my PAGs propaganda below needs to be kept, but I couldn't resist..... thanks :)

Sara DeCair---06/09/2011 11:26:34 AM---(see what you think, below, rough draft) There are four primary issues that we can resolve as follow

From: Sara DeCair/DC/USEPA/US
To: Jonathan Edwards/DC/USEPA/US@EPA, Daniel Schultheisz/DC/USEPA/US@EPA
Date: 06/09/2011 11:26 AM
Subject: draft Note from Debbie to Bob?

(see what you think, below, rough draft)

There are four primary issues that we can resolve as follows:

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Subject: Merge spreadsheets?
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: kzirbel@endyna.com
Cc: CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA
Submit Time: 2/14/2011 10:12:10

Kylie,

Here is the Feb. 11 3:25 pm version of the comment spreadsheet -- no need to worry about how smashed together the left columns are (just was to make it easy to read on screen as we worked on them in a conf room) but if you could merge these Ch. 2 responses with the few sets of comments that came in late, that would be awesome. I know Darrell is working on Safety section responses today (denoted by 'worker' or 'w' in the Ch. 2 responses for now) and I will work on some of the Add'l work needed items today. I guess to avoid messing up versions, we should always save with date and time in the filename and trust Kylie to smash stuff together when needed. Cool?

Thanks so much,

Sara

PAGs Comment Responses Feb 11 325 pm.xlsx

I am going to be the host?

Nate McMichael
U.S. Environmental Protection Agency
Radiation Protection Division
Office: (202) 343-9265
Cell: (202) 236-4176

Sara DeCair---07/19/2010 09:22:59 AM--- Ex. 6 - Personal Privacy Participant code - Ex. 6 - Personal Privacy

From: Sara DeCair/DC/USEPA/US

To: Nate McMichael/DC/USEPA/US@EPA

Date: 07/19/2010 09:22 AM

Subject: Re: For 11 am PAGs 30-min meeting

Ex. 6 - Personal Privacy
Participant code - Ex. 6 - Personal Privacy
Host code - Ex. 6 - Personal Privacy
Tx!

Sent by EPA Wireless E-Mail Services
Nate McMichael

----- Original Message -----
From: Nate McMichael
Sent: 07/19/2010 09:07 AM EDT
To: Sara DeCair
Subject: Re: For 11 am PAGs 30-min meeting
What is the call in number? I will call in from the EOC.

Nate McMichael
U.S. Environmental Protection Agency
Radiation Protection Division
Office: (202) 343-9265
Cell: (202) 236-4176

Sara DeCair---07/19/2010 08:52:53 AM---Hi all, I'm back! I plan to call in from home for today's 11 am meeting on PAGs, and here are som

From: Sara DeCair/DC/USEPA/US

To: edwards.jonathan@epa.gov, veal.lee@epa.gov, perrin.alan@epa.gov, liles.darrell@epa.gov, mcmichael.nate@epa.gov, nesky.tony@epa.gov

Date: 07/19/2010 08:52 AM

Subject: For 11 am PAGs 30-min meeting

Hi all, I'm back!

I plan to call in from home for today's 11 am meeting on PAGs, and here are some things you probably already have, to go over today:

- Comms Plan with tactics from July 6th, which I plan to update based on today's discussions
- A one-pager for the multi-agency conference call this Thursday

Talk to you soon!

Sara[attachment "Comms Plan 7-6-2010 with subtactics.doc" deleted by Nate McMichael/DC/USEPA/US] [attachment "One pager on new Agency direction 5-21-2010.doc" deleted by Nate McMichael/DC/USEPA/US]

From: "Tyler A. Willis" <twillis@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Cc: Darrell Liles/DC/USEPA/US@EPA "Smita Siddhanti" <siddhanti@endyna.com>
Subject: RE: Fwd: Easy PAGs edits, correct versions and talk today or tomorrow?
Submit Time: 6/27/2011 11:33:00

Sara,

Attached are the FR and Manual documents with the comment matrices for each. Per the comments that you supplied us, we incorporated all changes except those pertaining to finding more recent references (the previous email stated that you and Darrell were going to work on that task) and the addition of a link to accessing the Manual from the FR document (we are not sure how to incorporate the comment).

Would you like to discuss these issues today or wait until we speak tomorrow at noon?

Regards,

Tyler Willis
Senior Environmental Consultant
twillis@endyna.com
EnDyna, Inc.
7926 Jones Branch Drive, Suite 620
McLean, VA 22102
Tel: (703) 848-8842, ext. 124
Fax: (703) 848-9001
www.endyna.com

-----Original Message-----
From: DeCair.Sara@epamail.epa.gov [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Monday, June 27, 2011 10:58 AM
To: Tyler A. Willis
Cc: Liles.Darrell@epamail.epa.gov
Subject: Re: Fwd: Easy PAGs edits, correct versions and talk today or tomorrow?

Tyler,

Here you go! Thanks,

Sara

(See attached file: draft PAG Manual 5-24-2011.doc)(See attached file: draft PAGs FR Notice 5-24-2011.doc)

From: "Tyler A. Willis" <twillis@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA
Date: 06/27/2011 10:55 AM
Subject: Fwd: Easy PAGs edits, correct versions and talk today or tomorrow?

Sara,

I am currently working on going through the PAGS edits. Would you please send me the necessary attachments (FR and Manual) that you referenced in your email to Smita? We should be able to have this to you early afternoon with those we are capable of addressing immediately.

Let me know if you have any questions or concerns.

Regards,

Tyler Willis
Senior Environmental Consultant
twillis@endyna.com
EnDyna, Inc.
7926 Jones Branch Drive, Suite 620
McLean, VA 22102
Tel: (703) 848-8842, ext. 124
Fax: (703) 848-9001
www.endyna.com

PAGs Comment Sheet with Responses 6-27-2011.xlsx **draft PAG Manual 6-27-2011.doc** **draft PAGs FR Notice 6-27-2011.doc** **PAGs FR Notice Comments 6-27-2011.xlsx**

From: "Smita Siddhanti" <siddhanti@endyna.com>
To: Darrell Liles/DC/USEPA/US@EPA
Cc: "'Kylie Zirbel'" <kzirbel@endyna.com> Sara DeCair/DC/USEPA/US@EPA
Subject: REVISED PAGS AND FR DRAFTS FOR YOUR REVIEW
Submit Time: 2/24/2011 20:47:59

Hi Liles:

As we discussed, we are sending you the edited version of Draft PAGS Manual and the FR notice document. If you want to see what we addressed, we have included the comment response documents for both PAGS manual and FR Notice, which is color coded for you to know what got addressed and which did not and why. In addition, we have enclosed both PAGS Manual and FR Notice documents in two versions – one with track changes and other with accepted changes.

Thus, there are a total of 6 attachments:

1) Redline version of PAGs Manual
2) Revised PAGs Manual (with changes accepted)
3) Excel spreadsheet with the PAGs manual Comments and EPA responses
4) Redline version of the FR Notice
5) Revised FR Notice (with changes accepted)
6) Excel spreadsheet with the FR Notice Comments and EPA responses

The two spreadsheets are coded in the following way:

1) Yellow Items- Need to be Addressed

2) Orange Items- For Subcommittee Review

3) Blue Items- Agency Specific or Individual Specific Review

4) Purple Items- General Editorial Comments to be Completed

5) Green Items- Senior Management Decision

6) x- Change was made to the document

7) NA- No Change made as EPA disagreed with the comment

Please note: the page numbers and line numbers correspond to the last draft of the PAGs manual, they do not correspond to the edited document.

For the fastest review, you should only look over the documents ending in “accepted” and see if anything jumps at you. If you have more time, you can look over the comments matrix and do some spot checking to see that it is done right.

At the end, we plan to send the committee members the accepted versions of both FR and PAGS manual along with the comment response matrix for both. If you give us OK for these, or send us your edited versions, we will send it off to the committee members around 1 PM or so.

Hope it is all clear, if not, please feel free to call my cell phone 703-217-4800 and I will keep it on during my morning meetings.

Thanks!

-Smita

Smita K. Siddhanti, Ph.D | Program Manager

P: 703.848.8840 | F: 703.848.9001

Cell-703-217-4800

EnDyna, Inc.

7926 Jones Branch Drive.

Suite 620

McLean, VA 22102

www.endyna.com

DraftPAGManual For meeting on 2-28-2011 EnDyna version.doc DraftPAGManual For meeting on 2-28-2011 EnDyna version-accepted.doc PAGS FR Comments and EPA Response for FR 2-28-2011 Meeting.xlsx Draft PAGFR for the 2-28-2011 meeting.doc Draft PAGFR for the 2-28-2011 meeting-accepted.doc PAGs Comment Sheet with Responses for 2-28-2011 Meeting-rev.xlsx

Subject: the draft presentation
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Jeanette Eng/OU=R2/O=USEPA/C=US
Submit Time: 10/25/2011 18:05:16

I stole mightily from yours and added some of ours. Here is the draft presentation. If you have the time, I would appreciate your comments on it.

I didn't change any of the notes even though some are a little out dated (we have made some progress on new RERT equipment, etc.). I notice you don't say anything about drinking water in the PAG, is that out of the version that went to OMB? (How could I lose track!)

Steve Touw might be giving the 15-minute presentation instead of me, since we do have travel restrictions (only one EPA person to a meeting, generally).

EPA Rad Nuc Capabilities.TAKE 2.ppt EPA Rad Nuc Capabilities.TAKE 2.ppt

You still have Colby on there :(

Thomas Agee
Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933
Fax: (202)-343-2302

Sara DeCair---06/30/2010 02:07:01 PM---PAGs Partners; I am hoping to set up a 60 to 90 minute conference call to discuss the PAGs Manual re

From: Sara DeCair/DC/USEPA/US

To: Andrew.Wallo@eh.doe.gov, cym3@cdc.gov, man@cdrh.fda.gov, patricia.milligan@nrc.gov, ricardo.reyes@dtra.mil, stanton.colby@epa.gov, Sara DeCair/DC/USEPA/US@EPA, stephen.domotor@eh.doe.gov, Vanessa.Quinn@dhs.gov, william.cunningham@nist.gov, walker.stuart@epa.gov, ammon.doug@epa.gov, schumann.jean@epa.gov, Ferris.John@dol.gov, druedy@endyna.com, siddhanti@endyna.com, asa4@CDC.GOV, Jack.Patterson@rss.usda.gov, tdkraus@sandia.gov, "Conklin, Craig" <craig.conklin@HQ.DHS.GOV>, "MacKinney, John A" <John.Mackinney@dhs.gov>

Cc: Alan Perrin/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, Nate McMichael/DC/USEPA/US@EPA, Jessica Wieder/DC/USEPA/US@EPA, Thomas Agee/DC/USEPA/US@EPA

Date: 06/30/2010 02:07 PM

Subject: PAGs - Respond with availability for Conf Call

PAGs Partners;

I am hoping to set up a 60 to 90 minute conference call to discuss the PAGs Manual revision. The Agency administration has reviewed our Jan. 2009 proposal and we're ready to get started again toward getting the revision out for public review & comment! By COB on Thursday, July 8th, please tell me which of these times you are NOT available for a call. Thank you so much, and I look forward to talking with you!

Monday, July 19, 9 to 11 am
Wednesday, July 21, 9 to 11 am or 1 to 3 pm
Thursday, July 22, 9 to 11 am

Sara
Sara D. DeCair, Health Physicist
www.epa.gov/radiation/rert/pags.html
Center for Radiological Emergency Management
U.S. Environmental Protection Agency
office (202) 343-9713
fax (202) 343-2304
decair.sara@epa.gov

Subject: Fw: OEM comments on Markey response
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
Submit Time: 11/6/2009 06:30:51
To: mcmichael.nate@epa.gov "Jessica Wieder" <Wieder.Jessica@epamail.epa.gov>

Fyi not all of OSWER yet. Hm.

Sent by EPA Wireless E-Mail Services
Dana Tulis

----- Original Message -----
From: Dana Tulis
Sent: 11/06/2009 12:15 AM EST
To: Sara DeCair; Jonathan Edwards; Colby Stanton
Cc: Elizabeth Southerland; John Cardarelli; Mark Mjoness; Steve Hawthorn; Stuart Walker; Jean Schumann; Debbie Dietrich
Subject: OEM comments on Markey response

Here you go, this includes comments from OEM folks. Markey response - oem commdt.doc Markey response - oem commdt.doc

---
Dana S. Tulis
Deputy Director
Office of Emergency Management
Environmental Protection Agency
202-564-8600

- August 30 - I sent a modification request to extend until 9/30/2011 - I know that Contracts received the requested, because one of the actions on it has been completed - but I can't seem to find a copy..... I've requested a copy of the Contract Modification - I should have it today - so stand by.

Val

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Valerie Daigler
U.S.EPA/OAR/ORIA
Radiation Protection Division (6608J)
202/343-9204
202/343-2302 (fax)

Sara DeCair---11/30/2010 07:59:37 AM---Val, just curious if my long-awaited support from Endyna on the PAGs is ready to roll, as we're fina

From: Sara DeCair/DC/USEPA/US

To: daigler.valerie@epa.gov

Cc: "Darrell Liles" <liles.darrell@epa.gov>

Date: 11/30/2010 07:59 AM

Subject: Ok to use Endyna?

Val, just curious if my long-awaited support from Endyna on the PAGs is ready to roll, as we're finally at a point again to need them. Plz let me know if there is any paperwork to do. As before, the delay is due to internal gov't discussions, not any probs with the contractor. Thank you!
S.

Sent by EPA Wireless E-Mail Services
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

PAGs Comment Sheet with Responses 3-10-2011 -2

pm.xlsx PAGs Comment Sheet with Responses 3-10-2011 -2 pm.xlsx

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

Sara DeCair---03/10/2011 02:10:43 PM---Check the latest Manual if you would, but I think the best way to address it is to refer the reader

From: Sara DeCair/DC/USEPA/US
To: Darrell Liles/DC/USEPA/US@EPA
Date: 03/10/2011 02:10 PM
Subject: Re: comment

Check the latest Manual if you would, but I think the best way to address it is to refer the reader to the 1992 Manual, where in Appendix C the detailed risk analysis is provided. Here is what I have pulled out of that, just for quick reference. I would rather not try to restate all this in the new revision, though:

[attachment "Basis info for Intermediate Phase PAGs.docx" deleted by Darrell Liles/DC/USEPA/US]
[attachment "Basis info for Early Phase PAGs.docx" deleted by Darrell Liles/DC/USEPA/US]

Darrell Liles---03/10/2011 01:55:33 PM---Sara, Here is one that we haven't done anything with yet. We agreed but no change yet.

From: Darrell Liles/DC/USEPA/US
To: Sara DeCair/DC/USEPA/US@EPA
Date: 03/10/2011 01:55 PM
Subject: comment

Sara,

Here is one that we haven't done anything with yet. We agreed but no change yet.

John Cuellar	DHS	202-254-24	john.cuellar@dhs	11	2.3	3.4	Technical	This conclusion is based primarily on EPA's determination concerning acceptable levels of risk of health effects from radiation exposure in an emergency situation. Include what the levels of risk were used to make this conclusion? What risk level was used?

Darrell Liles
Health Physicist
Center for Radiological Emergency Management
Environmental Protection Agency MC-6608J
1200 Pennsylvania Ave NW
Washington DC 20460-1000
Phone (202)343-9550

From: "Kylie Zirbel" <kzirbel@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA Darrell Liles/DC/USEPA/US@EPA <siddhanti@endyna.com>
Subject: PAGs update
Submit Time: 3/4/2011 17:57:59

Hi Sara,

I have attached the updated PAGs manual and comment response sheet per our conversation today. I would have like to spend more time with it but I know you wanted to get it today! We will be sending another draft on Tuesday. Thank you!

Sincerely,

Kylie Zirbel | Analyst

P: 703.848.8842 x126

kzirbel@endyna.com

EnDyna, Inc.

7926 Jones Branch Drive.

Suite 620

McLean, VA 22102

www.endyna.com

DraftPAGManual EnDyna Version 3-4-2011.doc **Copy of PAGs Comment Sheet with Responses 3-4-2011.xlsx**

Subject: DRAFT papers for Monday
To: CN=Jim Knoy/OU=DC/O=USEPA/C=US@EPA CN=Lisa Nanko/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US@EPA CN=Nate McMichael/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Mike Flynn/OU=DC/O=USEPA/C=US@EPA CN=Debbie Dietrich/OU=DC/O=USEPA/C=US@EPA
From: CN=Lee Veal/OU=DC/O=USEPA/C=US
Submit Time: 12/3/2010 15:15:22

Dear Jim and Lisa,

Here are two documents that may be useful in your preparation for the Monday discussion.

The first is a simple agenda that may be useful in focusing our discussions.

Agenda Template.docx Agenda Template.docx

The second is the revised draft 2-pager that would be useful for background reading. We incorporated OGC and OSRTI comments and tightened up the text a bit. We also added some focus points to the top.

Bob P briefing paper DRAFT 12 3 10.doc Bob P briefing paper DRAFT 12 3 10.doc

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Preparation for DA Briefing

Discussion of Nuclear Power Plant Exercise & Protective Action Guidelines

Monday, December 6, 2010

10:00 am, ARN Rm. 6426C

- Key Issues and Background (OHS)
  - Briefing for Deputy Administrator Bob Perciasepe on December 10
    - 2 Goals: Update Bob on recent activities and obtain guidance on how we will address cleanup policy discussions
      - SOE/PLE exercise identified the need for communicating on cleanup approach after a nuclear power plant accident
      - PAGs Manual revision is beginning interagency review
      - Dec 8 brief for Rep. Markey staff on PAGs and cleanup
      - Nuclear Energy Summit
      - Several recent media articles expressing concern about "lack of a coordinated federal response strategy"
    - Additional discussion items?
  - Briefing pape

<u>Invitees:</u>

OSWER: Barry Breen, Dana Tulis, OEM, Elizabeth Southerland, OSRTI, Mathy Stanislaus (not anticipated to attend)

OAR: Gina McCarthy, Mike Flynn, ORIA, Jonathan Edwards ORIA, Lee Veal, ORIA, Sara DeCair, ORIA

OGC: Scott Fulton, Mary-Kay Lynch, SWERLO

OHS: Debbie Dietrich, Jim Knoy, Juan Reyes, Lisa Nanko

Kylie,

I've attached the latest comment responses. Only chapter 1 and chap 2 should be new to your spreadsheet.

Sara,

Let me know which comments you get through tonight so we are not duplicating efforts! I can't work on these tonight but would be glad to tomorrow evening and Thursday.

Thanks!

Darrell**Copy of PAGs Comments 2-22-2011 3 PM Liles.xlsx**

I'm all for another pair of eyes, but it isn't a spreadsheet, it is a computer program, due to the calculus involved. My "double check" was to check with Terry K's numbers for ICRP 60+ dosimetry from the PAG revision.

Following the method from the example calculations that we sent to John S. would produce similar results and be a good, quick second check.

Or do you have another idea? I can extract critical values calculated from the integrations if needed.

I can also investigate another numerical method (Gaussian Integration of Moments) which would make the calculations spreadsheet friendly. I'll make that a priority if there are no other fires this morning.

Lowell Ralston---03/31/2011 05:02:10 AM---Scott, Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calc

From: Lowell Ralston/DC/USEPA/US

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA

Date: 03/31/2011 05:02 AM

Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Scott,

Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calculations and parameter values? A second pair of eyes always helps!

Lowell

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/30/2011 04:24:35 PM---Here is the table for Cs-137. **Ex. 5 - Deliberative Process**

Ex. 5 - Deliberative Process

From: Scott Telofski/MTG/USEPA/US
To: EOC Environmental Unit@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Lowell Ralston/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-

James/DC/USEPA/US@EPA
Date: 03/30/2011 04:24 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Here is the table for Cs-137. **Ex. 5 - Deliberative Process**

Ex. 5 - Deliberative Process

[attachment "Air Particulate Trigger Levels for Cs-137.docx" deleted by Lowell Ralston/DC/USEPA/US]

EOC Environmental Unit---03/30/2011 12:59:17 PM---Hi Scott: Jon Edwards has proactively requested a protective action guides table for Cs-137 similar

From: EOC Environmental Unit

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Lowell Ralston/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Ron Fraass/MTG/USEPA/US@EPA, Bonnie Gitlin/DC/USEPA/US@EPA

Date: 03/30/2011 12:59 PM

Subject: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Hi Scott:
Jon Edwards has proactively requested a protective action guides table for Cs-137 similar to the one you and others prepared for I-131 in the last several days. I understand you are the go to person to make this happen: -)

Please send us the Cs-137 PAG table by Noon EDT March 31 and let us know if you have questions.
Thank you!
Schatzi

Submit Time: 11/3/2009 13:16:02
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Colby Stanton/OU=DC/O=USEPA/C=US@EPA CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: Time to read Markey responses on b-berry?

Here is a long paste -- at this point, will you take a look (and Alan, too?) and then tomorrow morning I can include people like Mike Boyd, Dana Tulis, and Jon? Who else? Sue, who is coordinating for OGC? Thomas and Nate drafted these then Jess helped edit before I did some edits. We have bets that a lot of detail will be cut on its way up... thanks for any suggestions!! (It takes a village...)

DRAFT – MARKEY LETTER CONTROL RESPONSE to PAGs QUESTIONS

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Submit Time: 6/27/2011 13:08:29
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: twillis@endyna.com
Cc: siddhanti@endyna.com CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA
Subject: Fw: one last thing on page 13 of the PAG manual

Sorry Tyler! I deleted this paragraph, as you'll see in the updated attachment. Sorry to juggle versions but just so you know, this additional comment should be incorporated (by making the deletion). Thanks!

Sara

draft PAG Manual 6-27-2011.doc draft PAG Manual 6-27-2011.doc
----- Forwarded by Sara DeCair/DC/USEPA/US on 06/27/2011 01:07 PM -----

From: William Nickerson/DC/USEPA/US
To: Darrell Liles/DC/USEPA/US@EPA
Cc: Sara DeCair/DC/USEPA/US@EPA
Date: 06/27/2011 11:50 AM
Subject: one last thing on page 13 of the PAG manual

Darrell,

I'm still having trouble believing the statement on page 13 that

"The risk of injury or death to individual evacuees from transportation does not change as a function of the number of people evacuated and can be conservatively estimated using National Highway Safety Council (NHSC) statistics for motor vehicle accidents (DOT 2004). Furthermore, only four of the 50 evacuation cases in the NRC study reported traffic accidents during evacuation (NRC 2005)."

I've looked at the two references and haven't seen anything that supports the idea that individual risk does not change as a function of the number of people evacuated.

Could you please point me to some support for that statement. And also, the NHSC stats come out every year, so we might be able to update the reference to DOT 2009 or 2010.

Subject: 1 -- Fw: Request for PAGS
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Stuart Walker/OU=DC/O=USEPA/C=US
Submit Time: 7/22/2009 21:33:51

----- Forwarded by Stuart Walker/DC/USEPA/US on 07/22/2009 08:59 PM -----

From: Edward Tupin/DC/USEPA/US@EPA

To: Stuart Walker/DC/USEPA/US@EPA

Cc: Bruce Means/DC/USEPA/US@EPA, Charles Sands/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, Frank Marcinowski/DC/USEPA/US@EPA, John Mackinney/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA

Date: 09/12/2003 08:42 AM

Subject: Re: Request for PAGS

Stuart, Here is the March draft of the water PAG, which is the one OW reviewed. I also included Appendix G, which is the more detailed technical material related to water.I'll send the revised version when I have finished revising to address the comments.

(See attached file: appG-3-20-03 draft.wpd)(See attached file: Ch4-3-21-03.wpd)

Ed
Edward A. Tupin, MS, CHP
Health Physicist
Center for Radiological Emergency Preparedness, Prevention and Response
US Environmental Protection Agency
501 Third St. Mail Code 6608J
Washington, DC 20460

(202) 564-9383appG-3-20-03 draft.wpd appG-3-20-03 draft.wpd Ch4-3-21-03.wpd Ch4-3-21-03.wpd

Subject: [clips] Radiation News Clips for August 21, 2009
From: CN=Ladonya Christopher/OU=DC/O=USEPA/C=US
To: OAR-ORIA-Clips
Cc:
Submit Time: 8/20/2009 13:12:18

Radiation News Clips
August 21, 2009

Radioactive Waste

Particle found at site of proposed Dounreay Low Level Waste facility (Environmental Expert)

http://www.environmental-expert.com/resultEachPressRelease.aspx?cid=21104&codi=60668&lr=1

The fuel fragment was recovered some 240m inland from the sea cliffs and the two shovels worth of radioactive waste some 300m inland of the sea cliffs.

Smoke Detectors Cannot Be Recycled in Madison (WMTV)

http://www.nbc15.com/newsyoucanuse/headlines/53705677.html

Old detectors can be sent back to First Alert, Radioactive Waste Disposal, 780 McClure Rd, Aurora, IL60504-2495. For information on First Alert Detectors .

FEARING EPA STAFF, ACTIVISTS SEEK TALKS TO HALT BUSH RADIATION POLICIES

(Water Policy Report)
A coalition of major environmental groups is urging recently confirmed EPA officials to delay decisions on several pending radiation protection policies until after the officials have met with the groups to discuss public health problems the activists believe the policies would cause. (see attached)

NUCLEAR EMERGENCY GUIDE ON HOLD PENDING MCCARTHY CONFIRMATION

(Inside EPA)
EPA is likely to wait until the Senate has confirmed President Obama's pick to head the agency's air office, Gina McCarthy, before deciding whether to advance a controversial draft guide for responding to nuclear emergencies, a key EPA official tells Inside EPA. (see attached)

Hanford

Hanford Radioactive Waste Treated by 2047 Under Fed-State Settlement

(Environment News Service)

http://www.ens-newswire.com/ens/aug2009/2009-08-19-093.asp

The Department of Energy has agreed to propose a moratorium on new radioactive waste shipments to Hanfordbefore the Waste Treatment Plant is operational.

Rep. Dicks checks out Hanford cleanup (Mid Columbia Tri City Herald)

http://www.tri-cityherald.com/kennewick_pasco_richland/story/687438.html

Dicks said cleaning up Hanfordwaste is a top priority, and that's why he fought against a proposal to reduce the annual cleanup budget.

Nuclear Power

China approves Tianwan nuclear plant expansion (AFP)

http://www.google.com/hostednews/afp/article/ALeqM5jqUm767g5mCZO6WqeqfNwwXVJTxQ

China has given the green light to a plan to start building the third phase of its Tianwan nuclear power plant on the east coast from October next ...

Nuclear Weapons

Outgoing IAEA chief has tough choice on Iran (The Associated Press)

http://www.google.com/hostednews/ap/article/ALeqM5h3ynZjvcWWut27ZvhXWnbq6GoK4QD9A6LM5G0

For close to a year, diplomats say, a report on Iran's alleged nuclear weapons experiments has been sitting in a drawer of a UN nuclear monitoring ...

North Korea Wants Direct Nuclear Talks With US, Richardson Says

(Global Security Newswire)

http://www.globalsecuritynewswire.org/gsn/nw_20090820_3816.php

Cha said, though, that "the bottom line is still the same problem, which is: Are they willing to give up their nuclear weapons?

Note: When you set up an out-of-office automated reply, please exclude the Radiation Clips from reply. You can do this by selecting the "Exceptions" tab and typing "[clips]" in the "Do not reply if the subject line contains this phrase" box. This will save the editors from deleting so many out-of-office replies. Thank you!

Questions or Comments? Contact: LaDonya Christopher (301.203.1912) or Glenna Shields (202.343.9849).

FEARING EPA STAFF_082109.doc **NUCLEAR EMERGENCY GUIDE ON HOLD PENDING MCCARTHY CONFIRMATION_082109.doc**

FEARING EPA STAFF, ACTIVISTS SEEK TALKS TO HALT BUSH RADIATION POLICIES

A coalition of major environmental groups is urging recently confirmed EPA officials to delay decisions on several pending radiation protection policies until after the officials have met with the groups to discuss public health problems the activists believe the policies would cause.

The activists are seeking to meet directly with the officials to counter approaches pushed by staff in EPA's Office of Radiation & Indoor Air (ORIA), who the environmentalists doubt will adequately brief the agency's new political leaders on the controversies surrounding the policy proposals.

In an Aug. 5 letter to the political appointees heading up the Obama EPA's air, water and waste offices, the environmental groups -- including the Natural Resources Defense Council, Sierra Club and Clean Water Action -- raise concerns over "several disturbing initiatives commenced during the prior Administration that are still pending before the agency and which would dramatically weaken public protections and have wide impacts across EPA." The letter was also sent to top officials in EPA's Office of General Counsel and copied to key lawmakers. *The letter is available on InsideEPA.com.*

Among the issues discussed in the letter, the groups say agency plans to "astronomically weaken" guidelines for protecting humans in the event of a nuclear emergency are "the most pressing." But the groups also raise concerns about EPA plans to relax radiation standards generally, ignore National Academy of Sciences (NAS) findings on radiation risks and allow radioactive waste in landfills not suited for the disposal.

The activists say "all of these problematic proposals were initiated within [EPA's] Office of Air & Radiation's troubled ORIA" and raise doubts that ORIA staff will adequately brief the agency's new political leaders on the controversies surrounding them.

According to the environmentalists, the agency's plan to weaken nuclear emergency guidelines, contained in a document known as the *Protective Action Guidance for Nuclear Incidents* (PAG), permits "radioactivity concentrations in drinking water *orders of magnitude higher* than EPA's long-held drinking water standards under the Safe Drinking Water Act (the MCLs, or maximum contaminant levels) or the emergency drinking water standards employed under" Superfund law.

Citing an award-winning series of *Inside EPA* articles on the draft guide, the letter describes the document as part of "a *sub rosa* effort to weaken [the agency's long-held drinking water standards] even after the agency -- affirmed by the court -- had previously rejected such an effort, finding it violated anti-backsliding requirements."

The letter notes EPA is currently processing a Freedom of Information Act (FOIA) request from the activist group Public Employees for Environmental Responsibility (PEER) seeking all internal and external communications related to the agency's development of the draft guide, and asks that the Obama EPA not take any further action on it until after the documents have been released and the activists have met with the Obama EPA officials.

"Since the FOIA asks for all documents identifying concerns raised about the ORIA PAG proposal, and since we are not confident that ORIA will voluntarily disclose to you the

criticisms its proposal has received, both from within and outside the agency, we urge you to not make a decision as to whether you will support release of the proposed PAGs until after you have met with us and also the FOIA response is complete so that you can be provided copies of relevant documents that expressed concerns about the proposed PAGs."

The environmentalists also raise concerns over a draft EPA guide for estimating cancer and death rates from radiation exposure, titled *EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population*. The guide, commonly known as the "Blue Book" was developed by EPA under the Bush administration and is currently being reviewed by the agency's Radiation Advisory Committee (RAC). The activists criticize the document for projecting significantly fewer incidents of cancer and death than a 2006 NAS study.

"This Administration has rightly pledged to end the politicization of science so endemic in the prior one," the environmentalists say. "Here we have a many-year study by the [NAS], performed at EPA request and then . . . [EPA] under the Bush administration proposed using lower risk estimates than the Academy recommended, which would result in high public exposures and more resulting cancers than would derive from the Academy's scientific recommendations."

In the letter, the environmentalists also ask that the Obama EPA not revive other radiation policies proposed under the Bush administration but ultimately not finalized. One such proposal was a controversial draft guide recommending relaxed radiation exposure limits for the general public, which the agency withdrew in June 2008, saying it needed to make additional revisions to the document.

NUCLEAR EMERGENCY GUIDE ON HOLD PENDING MCCARTHY CONFIRMATION

EPA is likely to wait until the Senate has confirmed President Obama's pick to head the agency's air office, Gina McCarthy, before deciding whether to advance a controversial draft guide for responding to nuclear emergencies, a key EPA official tells *Inside EPA.*

Jonathan Edwards, director of the Office of Radiation & Indoor Air's (ORIA) Radiation Protection Division, said the agency is unlikely to take further action on the document known as the *Protective Action Guidance for Radiological Incidents*, until after McCarthy can be confirmed and briefed by staff on the document. Edwards spoke to *Inside EPA* during the Radiation Advisory Committee's March 23-25 review of ORIA's new draft radiation risk estimates in Arlington, VA.

Former Bush EPA Deputy Administrator Marcus Peacock approved the controversial nuclear guide on Jan. 15., but days later the Obama administration halted its publication in the *Federal Register* pending further review after activists raised concerns the document could lead to drastically weakened public protections, particularly in drinking water.

Activists following the issue say it is unclear how McCarthy's appointment will affect the controversy surrounding the nuclear emergency guide and radiation protection issues generally. But one activist has preliminary reservations based on the fact that McCarthy, most recently the head of the Connecticut Department of Environmental Protection, has served primarily under Republican administrations and has a relatively limited amount of experience with radiation issues.

The nuclear emergency guide was not discussed during McCarthy's April 2 confirmation hearing. But according to the activist, Sen. Bernard Sanders (I-VT) has submitted a written question to McCarthy pertaining to the guide for the hearing record.

Sanders' staff could not immediately be reached for comment.

The nuclear emergency guide, which is intended to provide emergency responders at the federal, state and local levels with guidance on dealing with a wide variety of nuclear emergencies -- including so-called "dirty bomb" attacks and accidents at nuclear power plants and industrial facilities -- has created a firestorm of controversy since *Inside EPA* obtained an August 2007 internal draft of the document.

On Oct. 30, a coalition of more than 60 environmental and public health groups cited the August 2007 draft in a letter to then-EPA Administrator Stephen Johnson urging him not to approve the document. A detailed report the coalition attached to the letter echoed concerns raised by state regulators and some EPA staff that the draft guide suggests emergency officials need not consider providing alternative drinking water sources -- such as bottled water -- to people living in areas affected by a nuclear emergency until contamination reaches levels thousands of times higher than existing EPA guidance and regulations.

Since then, activists have threatened to sue EPA if it does not produce documents showing the agency complied with the National Environmental Policy Act (NEPA) when it developed the guide, a move some activists hope will deter the agency from moving forward with the document.

Public Employees for Environmental Responsibility (PEER) in February filed a Freedom of Information Act request seeking "all records relating to NEPA compliance in connection" with the draft guidance. In its request PEER says it "strongly suspect[s] the records show that EPA is in violation of NEPA in this important matter" and that "the response to this request may itself may be evidence in a lawsuit against the Agency for non-compliance with NEPA," which generally requires the government to assess the impacts of its actions on the environment.

In a Feb. 27 response EPA says it has no such records, noting that "[a]ctivities for the development of federal radiation regulations and guidance in accordance with the Atomic Energy Act of 1954 are functionally equivalent to NEPA." The agency adds that "[c]onsequently, the PAGs Manual updates meet NEPA policy goals by carrying out analyses, documentation and review procedures that are functionally equivalent to NEPA." *The response is available on InsideEPA.com.*

Environmentalists are now seeking further clarification on the issue, a second activist says, adding that environmentalists "do not think they are exempt from NEPA" and believe "nothing they have done is remotely equivalent." -- *Douglas P. Guarino*

edited PAG- FAQs.doc edited PAG- FAQs.doc

Thomas Agee---09/23/2009 01:16:16 PM---Thomas Agee Radiological Emergency Management Intern

From: Thomas Agee/DC/USEPA/US

To: Sara DeCair/DC/USEPA/US@EPA

Date: 09/23/2009 01:16 PM

Subject: EDITED PAGS FAQS

[attachment "edited PAG- FAQs.doc" deleted by Sara DeCair/DC/USEPA/US]

Thomas Agee
Radiological Emergency Management Intern
Radiation Protection Division
U.S. Environmental Protection Agency
Email: agee.thomas@epa.gov
Office: (202)-343-9933

Submit Time: 9/21/2012 13:59:47
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: "Whiteman, Chad" <Chad_S_Whiteman@omb.eop.gov>
Cc: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Subject: PAGs Manual and FR -- Word versions

Chad,

I hope these Word copies are helpful. Note that we've found a few improvements to make, like a corrected section reference and better formatting, but these are identical to what we sent over for review. Of course I'm curious what might be going on there! Let me know if there is anything at all we can do to be helpful.

Sara
202-343-9108

Draft 2012 PAG Manual 7-20-2012.docx Draft 2012 PAG Manual

7-20-2012.docx**Draft PAGs FR 7-20-2012.docx** Draft PAGs FR 7-20-2012.docx

Submit Time: 9/27/2012 15:32:08
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US@EPA CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: draft note and updated comment response background doc

draft note -- wordsmith as needed?

Debbie,

We've reviewed the Naval Nuclear Propulsion Program (NNPP) comments you sent us and we're confident that even though a couple of their comments suggest fairly big shifts in the basis for our PAGs, the technical and policy implications could be discussed with NNPP and resolved with either minor wording clarifications or an agreement to addres them during the public comment adjudication process with our multi-agency FRPCC PAGs Subcommittee.

Since we haven't gotten an official passback from OMB, however, the attached is just for your (and Mike Flynn's) information, and is not intended as a memo to share with NNPP or NSS. We might have a staff-level conversation though, to see if our points in response resonate with the NNPP technical experts who provided these comments.

Several of the comments provided are very easily incorporated, where the suggestions add clarity or accuracy to language in the Manual. I hope this is helpful for your next conversation on PAGs.

Jon

Navy Nuke comment responses draft 9-27-2012.docx

Navy Nuke comment responses draft 9-27-2012.docx

Subject: Material for 5/24 briefing
To: CN=Kirsten King/OU=DC/O=USEPA/C=US@EPA CN=Sharon Cooperstein/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Mike Flynn/OU=DC/O=USEPA/C=US@EPA CN=Jonathan Edwards/OU=DC/O=USEPA/C=US@EPA CN=Anna Duncan/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
From: CN=Alan Perrin/OU=DC/O=USEPA/C=US
Submit Time: 5/23/2012 12:47:07

Kirsten, Sharon,

Material for ORIA's meeting with the AA (5/24, 5:30 pm, *Update on PAGs*) is attached. Please give me a call if you have questions. Thanks, Alan

Process Path for PAGs 5-23-2012.docx Process Path for PAGs 5-23-2012.docx

~~~~~~~~~~~~~

Alan Perrin, Deputy Director
Radiation Protection Division, USEPA
office (202) 343-9775 | bb (202) 279-0376
~~~~~~~~~~~~~

PAG Manual

Protective Action Guides and Planning Guidance for Radiological Incidents

Issue: We hope to publish an updated PAG Manual and incorporate several related tasks.

Background:

- (6/2011) PAGs Manual version submitted to OMB, approved through OAR, OSWER, OW, OP, OGC
- (7/2011–9/2011) OMB led interagency review of PAGs Manual, intimated that comments focus on issues related to clean-up and emergency levels for drinking water
- (9/2011–Now) No additional OMB activity on PAGs Manual
- (5/2012) Final PLE papers issued by NSS
  - Re-entry (version dated 4/4/2012)
  - Clean-up (version dated 4/12/2012)
  - Waste Disposal (version dated 4/13/2012)
- (5/2012) White House tasks EPA to merge the PLE papers with the 2008 DHS RDD/IND Planning Guidance, the focus of the merger is on cleanup

Path Forward:

- Federal Register (FR) Notice of Availability of updated guidance for Public Review and Comment that includes the 6/2011 PAGs Manual with these edits:
  - Minimal new introductory language to reflect addition of recent PLE papers
  - Edits to remove any conflicting language
  - Additional chapters as noted on next page (i.e., the three PLE papers)
  - Incorporate the 2008 RDD-IND Planning Guide to bolster Late Phase (cleanup) recommendations with an example process and workgroups
  - Re-title document "Protective Action Guides and Planning Guidance for Radiological Incidents"
- NSS asked EPA to produce a combined document by late May
  - Intra-agency review 5/24–5/30 (Memorial Day weekend) to include OP (previous PAGs internal review occurred 3/26–4/11, OSRTI, OGC & OW commented; OEM deferred)
  - Meeting with DA on 5/30
- NSS will provide final version to Deputies prior to FR
- EPA prepares final FR package to publish xx/2012

Outstanding Issues:

- Intra-agency review – drinking water, cleanup
- When and how to engage with OMB?
  - Timing with NSS and the Deputies?
- Ensuring a positive reception among multi-agency partners

ED_001057C_T3_00162243

Outline for "Protective Action Guides and Planning Guidance for Radiological Incidents"

- The Federal Register Notice describes the updates to the Manual since 1992, explains the multi-agency process and the goals of the update. Public reviewers are asked to comment specifically on the newly incorporated sections and minor updates to the existing PAGs.
- Ch. 1: Overview of the Manual
  - 6/2011 version with edits to reflect addition of PLE papers
- Ch. 2: Early Phase
  - 6/2011 version of PAGs Manual (Shelter/Evacuation and potassium iodide (KI) PAGs, Worker Guides as written previously)
- Ch. 3: Intermediate Phase
  - 6/2011 version includes Relocation PAGs, references to FDA's Food PAGs and the Safe Drinking Water Act
  - Re-entry (PLE paper)
- Ch. 4: Late Phase
  - Cleanup paper (PLE Paper)
  - Late phase guidance from 2008 DHS RDD/IND Planning Guide
  - Waste Disposal (PLE Paper)
- App. A: References
- App. B: Glossary
- App. C: Acronyms

Note: this document does **not** include the DOJ Legal Authorities paper.

ED_001057C_T3_00162243

Subject: Fw: CLOSE HOLD---Fw: PAG Manual - interagency comments
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US
Submit Time: 10/2/2012 18:08:15

FYI
----- Forwarded by Jonathan Edwards/DC/USEPA/US on 10/02/2012 06:08 PM -----

From: Mike Flynn/DC/USEPA/US
To: Gina McCarthy/DC/USEPA/US@EPA
Cc: Betsy Shaw/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA
Date: 10/02/2012 05:53 PM
Subject: Fw: CLOSE HOLD---Fw: PAG Manual - interagency comments

---

Gina,
Wanted to give you a heads up that OMB finally sent us the interagency comments on the PAGs Manual. The good news we now have them - the bad news is they are voluminous. We are taking a quick look now to cull out the big issues (one is the DW PAG), and will set up time with you shortly to discuss next steps and strategy for moving forward. FYI Debbie has alerted Bob that we now have these comments in hand.

Mike
to ----------\Sent by EPA Wireless E-Mail Services.
Jonathan Edwards

----- Original Message -----
From: Jonathan Edwards
Sent: 10/02/2012 09:40 AM EDT
To: Mike Flynn; Debbie Dietrich
Subject: CLOSE HOLD---Fw: PAG Manual - interagency comments
CLOSE HOLD

FYI--- OMB sent over the interagency comments on the PAG manual. The files are pretty voluminous, so we're going start sorting through these comments ASAP.... Jon

----- Forwarded by Jonathan Edwards/DC/USEPA/US on 10/02/2012 09:37 AM -----

From: Sara DeCair/DC/USEPA/US
To: "Lee Veal" <veal.lee@epa.gov>, "Alan Perrin" <Perrin.Alan@epamail.epa.gov>, "Jonathan Edwards" <Edwards.Jonathan@epamail.epa.gov>
Date: 10/02/2012 09:05 AM
Subject: Fw: PAG Manual - interagency comments

Fyi

----- Original Message -----
From: "Whiteman, Chad" **Ex. 6 - Personal Privacy**
Sent: 10/01/2012 09:50 PM GMT
To: Nicole Owens; Amy Cole
Cc: Sara DeCair; "Schwab, Margo" **Ex. 6 - Personal Privacy**
Subject: PAG Manual - interagency comments

Nicole & Amy,

Attached are the comments from the interagency review of the most recent version of the PAG Manual. Some comments were incorporated as redline edits in the PAG Manual while others were compiled in a summary document. Once you've had a chance to review the comments, we can schedule a time to discuss.

Thanks,

Chad

2012 PAG Manual 7-20-2012 Redline Comments from 10_1_2012.docx

10_1_2012.docx 2012 PAG Manual 7-20-2012 Redline Comments from 10_1_2012.docx**2012 PAG Manual 7-20-2012 Summary**

Comments 10_01_2012.docx 2012 PAG Manual 7-20-2012 Summary Comments 10_01_ 2012.docx

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Subject: FW: Minor edits -- then we're done (!!)
Submit Time: 6/29/2012 21:52:39

From: Brielle Welzer
Sent: Friday, June 29, 2012 5:51 PM
To: Brielle Welzer
Subject: RE: Minor edits -- then we're done (!!)

Hi Sara,

Sorry, ignore the last file. There were some spacing errors which I have corrected - the tables push the text a bit. And the text boxes were flying off the page - they tend to do that on Fridays.

Thanks,

- Brie

From: Brielle Welzer
Sent: Friday, June 29, 2012 5:39 PM
To: Sara DeCair
Subject: RE: Minor edits -- then we're done (!!)

Hi Sara,

Here are the tables with 10 point font. And better spacing throughout the document (Table of Contents, chapter titles, etc.) See if this works as a start - for less squinting.

Thanks!

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Friday, June 29, 2012 5:18 PM
To: Brielle Welzer
Subject: RE: Minor edits -- then we're done (!!)

Yeah, I think that might be the approach, maybe an outline view along the left side in Adobe? I'm sure there is some neat way to do that.

And if you can think about how most cleanly to increase the tables text font to 10 without trashing the page fit, that'll get one guy off my back ;)

S.

Brielle Welzer ---06/29/2012 05:15:21 PM---Hi Sara, Document Usability/Readability:

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 06/29/2012 05:15 PM
Subject: RE: Minor edits -- then we're done (!!)

Hi Sara,

Document Usability/Readability:

One more thing - it doesn't seem like I can easily insert (go back) options - for when jumping back to the original location. In websites, we add (top) links so that people can jump up to the top....

But it would be very nice to be able to pull down a document guide that shows the Table of Contents next to whatever section we're reading - so the reader could jump from there. I'm not sure if this is possible - but it would certainly make for easier doc. review. I'll find out if that kind of drop down document guide is available (for example, with a separate scroll button).

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Friday, June 29, 2012 4:30 PM
To: Brielle Welzer
Subject: Minor edits -- then we're done (!!)

Cool -- I am going through page by page to look for problems, too. In the PDF:

On page iii, there are weird page numbers, 143 and 210.

Do the sections jump from 3.5 to 3.7?

On page 45, will you put back in "in a manner that protects human health" after land use and "that are protective of human health and the enviroment" after cost-effective cleanup recommendations? These were suggestions that we had decided to reject, and I didn't convey that clearly to you. (So there is one deletion of "that are protective..." up on page 42, but we said Heck No to the page 45 ones. Compromise!)

On page C-1, remove the AMS Aerial Measuring System acronym since we took out the instance of it in the text a while ago.

That's all I see! If I could have a clean Word copy and PDF again, then we can both split for the day, eh??

S.

Brielle Welzer ---06/29/2012 03:59:57 PM---Hi Sara, Here are all of those updates:

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 06/29/2012 03:59 PM
Subject: RE: Dang - one more

Hi Sara,

Here are all of those updates:

- the two text edits (Footnote 7, and 2.6)
- updated the font on the new paragraph (so sorry about that!)
- updated text "F-6" to "E6"
and made one correction to the table of contents.

Here is the word doc and the PDF.

I'm going over the entire doc right now - but wanted to send you this update in case you need to get it out the door quickly and head on home. If I find anything, I'll email you updated versions, of course.

Also - I'm always a big fan of simply viewing PDFs at 150% but I will look into the font issue. It's a good thing to consider.

Thanks!

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Friday, June 29, 2012 2:39 PM
To: Brielle Welzer
Subject: Dang - one more

I'm going to keep finding these things (and people keep sending me comments, now is SO not the time to be sending me comments!!) but this is an easy one:

On p. 33, change the reference to Table F-6 in the 1992 PAG Manual (which doesn't exist, oops) to Table E-6.

Thanks![attachment "Draft 2012 PAG Manual 6-1-2012 v3.doc" deleted by Sara DeCair/DC/USEPA/US] [attachment "Draft 2012 PAG Manual 6-1-2012 v3.pdf" deleted by Sara DeCair/DC/USEPA/US] **Draft 2012 PAG Manual 6-1-2012 v5.doc** **Draft 2012 PAG Manual 6-1-2012 v5.pdf**

Still some infighting and outfighting, but here is what I've proposed to smash them together (again, close hold, etc. etc. etc):

Draft PAGs FR 04-17-2012.doc Draft PAGs FR 04-17-2012.docDraft

PAGs-Combined Document - 4-17-12.doc Draft PAGs-Combined Document - 4-17-12.doc

If you see opportunities to go to bat for the concept, let's chat!!

James Michael---05/03/2012 11:31:10 AM---Sara - thank you. I was just curious on how this was going to all fit together (the PAG's and SOE p

From: James Michael/DC/USEPA/US
To: Sara DeCair/DC/USEPA/US@EPA
Date: 05/03/2012 11:31 AM
Subject: Re: PAGs at OMB - still pending...

Sara - thank you. I was just curious on how this was going to all fit together (the PAG's and SOE papers) based on Lee's presentation last week at the HSCN. Hope everything is going well. Jim

---

James Michael, Chief
Waste Characterization Branch
Materials Recovery and Waste Management Division (MC-5304P)
Office of Resource Conservation and Recovery, USEPA
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Telephone: 703-308-8610
BlackBerry #: 703-409-3938
Fax: 703-308-0514
E-mail: michael.james@epa.gov

Send couriers to:
Two Potomac Yard
5th Floor, Room N-5641
2733 South Crystal Drive
Arlington, VA 22202

Sara DeCair---05/03/2012 11:03:59 AM---Jim, Dan said you were curious what was over at OMB in the way of PAGs. This is what was provided la

From: Sara DeCair/DC/USEPA/US
To: James Michael/DC/USEPA/US@EPA
Date: 05/03/2012 11:03 AM
Subject: PAGs at OMB - still pending...

Jim,

Dan said you were curious what was over at OMB in the way of PAGs. This is what was provided last July (!!!) and as you know, there is movement lately on trying to smash together the SOE papers with this proposal to get both things out the door. No discussion with OMB on that yet, so use caution on that concept!

S.

[attachment "draft PAG Manual 6-27-2011.doc" deleted by James Michael/DC/USEPA/US] [attachment "draft PAGs FR Notice 6-27-2011.doc" deleted by James Michael/DC/USEPA/US]

Subject: Fw: SCHEDULE CHECK: Meet on PAGs as soon as possible
From: CN=Lee Veal/OU=DC/O=USEPA/C=US
Submit Time: 7/11/2012 13:15:32
To: "Sara DeCair" <DeCair.Sara@epamail.epa.gov> "Alan Perrin" <Perrin.Alan@epamail.epa.gov> "Virginia Stradford" <Stradford.Virginia@epamail.epa.gov>

Looks like the 11 - 12 or 2 to 430 work for Debbie.
Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322
Lisa Nanko

----- Original Message -----
From: Lisa Nanko
Sent: 07/11/2012 12:55 PM EDT
To: Virginia Stradford; Lee Veal
Cc: "Debbie Dietrich" <dietrich.debbie@epa.gov>
Subject: Re: SCHEDULE CHECK: Meet on PAGs as soon as possible
Lee - I'm forwarding your request to Caroline Brown. She can check Debbie's schedule. (I'm in training.)

Lisa
Lisa Nanko
Environmental Scientist
Office of Homeland Security
Administrator's Office
U.S. Environmental Protection Agency
office: 202-564-0195
cell: 202-302-1102
Virginia Stradford

----- Original Message -----
From: Virginia Stradford
Sent: 07/11/2012 12:35 PM EDT
To: Lee Veal
Cc: Alan Perrin; Lisa Nanko; Sara DeCair
Subject: Re: SCHEDULE CHECK: Meet on PAGs as soon as possible
Hi Lee,

Mike is available on July 19 at either of these times.

Thanks.

-Ginny

Lee Veal---07/11/2012 11:55:11 AM---Good morning Virginia, Alan, and Lisa, OMB has responded to Sara's request for a meeting to discuss

From: Lee Veal/DC/USEPA/US
To: Virginia Stradford/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Lisa Nanko/DC/USEPA/US@EPA
Cc: Sara DeCair/DC/USEPA/US@EPA

Date: 07/11/2012 11:55 AM
Subject: SCHEDULE CHECK: Meet on PAGs as soon as possible

Good morning Virginia, Alan, and Lisa,

OMB has responded to Sara's request for a meeting to discuss the PAG and radiation guidance document with some possible times.
I understand that Mike Flynn and Debbie Dietrich were planning to attend with some staff from here.

Do any of their suggested times work for Mike, Debbie, and RPD?
Those times are: Thursday, July 19, at 9:30-10:30 am, 11-12 am, or 2-4:40 pm
Location: New Executive Office Building, OMB offices (plan on a bit of travel time, say 15-20 minutes before and after)

Lee

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
202-343-9448
cell 202-617-4322
----- Forwarded by Lee Veal/DC/USEPA/US on 07/11/2012 11:49 AM -----

From: "Schwab, Margo" Ex. 6 - Personal Privacy
To: Sara DeCair/DC/USEPA/US@EPA, "Whiteman, Chad" Ex. 6 - Personal Privacy
Cc: Alan Perrin/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA
Date: 07/11/2012 11:32 AM
Subject: RE: Meet on PAGs as soon as possible

At this point Thursday July 19th seems like the only possibility before July 20th . 9:30-10:30, 11-12 and 2-4:30 are currently open.

From: Sara DeCair [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Wednesday, July 11, 2012 7:35 AM
To: Schwab, Margo; Whiteman, Chad; Schwab, Margo
Cc: Alan Perrin; Lee Veal
Subject: Meet on PAGs as soon as possible

Margo and Chad,

Per my voice message, we are hoping to set up a meeting to discuss the PAG Manual. Following Gina McCarthy's conversation with Dom last Friday, she indicated that the next step was for us to provide a more detailed briefing to OMB on the PAG Manual revision, since we're confident that inter-agency comments have been addressed. In fact, the recent addition of SOE/PLE exercise products make it a much more complete and useful guidance that is ready for public review and comment.

Who is our point of contact (for calendars and scheduling) so that Debbie Dietrich, Mike Flynn, and and few of us staffers can come over as soon as possible? Debbie leaves the

country on July 20th so we're under a bit of pressure, but I'm sure we can find a mutually agreeable time to sit down this week or next.

Thanks so much for providing a contact, and I look forward to talking with you!

Sara

desk 202-343-9108
cell 202-738-2871

Submit Time: 11/20/2012 16:10:05
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: New iterations, before restarting computer

Latest...

PAG Manual with OMB cmts incorp NEW HIGHLITED 11-20-2012 v2.docx PAG Manual with OMB cmts incorp NEW HIGHLITED 11-20-2012 v2.docx**PAGS Comment Responses Nov 20 2012.xlsx** PAGS Comment Responses Nov 20 2012.xlsx

Submit Time: 9/21/2012 15:04:06
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA
Cc:
Subject: For your review first....

Lucky!! You've been chosen to take the first look at these draft responses for the PAGs comments we think NNPP might have submitted. I didn't address the "additional comments" since they weren't deemed critical to publishing the revision.

Navy Nuke comment responses draft 9-21-2012.docx

Navy Nuke comment responses draft 9-21-2012.docx

Subject: Re: Had a thought about the disposal section
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Daniel Schultheisz/OU=DC/O=USEPA/C=US@EPA
Cc:
Submit Time: 11/19/2012 15:46:06

You tell me.... here is the current version.

Thanks!

-----Daniel Schultheisz/DC/USEPA/US wrote: -----
To: Sara DeCair/DC/USEPA/US@EPA
From: Daniel Schultheisz/DC/USEPA/US
Date: 11/19/2012 03:41PM
Subject: Had a thought about the disposal section

I don't remember if the PAG version discusses the available disposal facilities and capacity in any detail (if that table is still in this version). I heard last month that Energy Solutions has an expansion of licensed capacity under state review (re-purposing capacity that was licensed for something else). And WCS will be taking out-of-compact waste. We might want to see if an update is in order.**PAG Manual with OMB cmts incorp NEW HIGHLITED 11-19-2012.docx**

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Subject: Updated Draft - July, Groundshine & Internal Links
Submit Time: 6/29/2012 18:20:17

Hi Sara,

Here is the new version.

Changes:

1. Changed the cover from "June" to "July"
2. Updated the groundshine definition.
3. Inserted bookmarks/hyperlinks wherever "see Section/Table" was mentioned (9 instances)

Issues:

1. There are two highlights that I have made:

one on Page 5 (it says: see Chapter 2, Section 2.7.2 - But I don't believe there is a 2.7.2. - maybe it should just say 2.7 (?)

one on Page 18 - which refers back to Page 16 and mentions a "Note 7")

One more issue: I have opted to underline the hyperlink so that it is: see Section XXX. to show the reader that it is a link. However, I'm unable to underline the references on Page 5 (there are two). I think this might be an issue with the MS compatibility. I will keep working on this to make sure that the links are in uniform format.

Also -- Do you have any preference for version control? When I send it back, I tend to put my initials on it and the date (new idea here) - but I'm happy to alter it to your style.

- I'll keep working on the other issues we discussed - heaviness, etc. Have a great vacation.

Thanks,

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Friday, June 29, 2012 11:45 AM
To: Brielle Welzer
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

Ok! Let me know if there is anything at all I can do to help -- thank you!!

Brielle Welzer ---06/29/2012 11:37:53 AM---Hi Sara, Sorry for the delay.

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 06/29/2012 11:37 AM
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

Hi Sara,

Sorry for the delay.

The Table of Contents hyperlinks have been holding me up a bit - but I should be able to finish this revision (including the hyperlinks, groundshine definition and "July" front cover) by 3 PM today. Is this all right?

Thanks for your patience,

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Friday, June 29, 2012 10:45 AM
To: Brielle Welzer
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

How's it going? I am getting ready to take a week off next week but will be reachable via email in case we get some green light to GO on the PAGs.... I'll leave the new PAGs version with my boss, Alan Perrin, so if he needs anything I'll encourage him to contact you.

Hope to hear from you soon :)

S.

Brielle Welzer ---06/27/2012 05:04:59 PM---Hi Sara, Great! Loud and clear - I'll make those updates and send back - probably by tomorrow aftern

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 06/27/2012 05:04 PM
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

Hi Sara,

Great! Loud and clear - I'll make those updates and send back - probably by tomorrow afternoon.

*Groundshine - will update that definition.

* Hyperlinks - absolutely. Easy.

* Heaviness - more difficult. Unlike an html page it's more difficult to squeeze, but I'll find out more about this from my tech gurus. - most likely a PDF - but an 80-page PDF might be able to be squeezed.

* Larger text - very possible, but necessary? worth it? I'll find out.

* Will change to July and take a moment for a small prayer - a time passing prayer.

Thanks for framing the "beautification" !

- Brie

From: Sara DeCair [DeCair.Sara@epamail.epa.gov]
Sent: Wednesday, June 27, 2012 4:57 PM
To: Brielle Welzer
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

It's great -- here are more ideas:

Go change defn of Groundshine in glossary to "Gamma radiation emitted from radioactive materials deposited on the ground."

And would a bigger font be better readable by the slightly mature target audience of this, for if they print it out? Makes it longer but may be worth it.

Could the Table of contents and all in-text references to sections or citations be hyperlinked within the document?

The doc also takes several seconds to load fully on my computer - is it carrying around any formatting weight, perhaps, from six straight years of editing? Not sure if there is a fix for that. In fact, I think the readers will be going to a nice PDF on the web, not a Word version.

Yes change to July! Wah :)

I am checking with the gurus here about chronic vs stochastic. I'm not sure.

More tomorrow, thanks a ton!!

Brielle Welzer ---06/27/2012 03:52:36 PM---Hi Sara, I've worked on the document -

From: Brielle Welzer <bwelzer@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Date: 06/27/2012 03:52 PM
Subject: RE: Beautify copy of PAGs? Say.... by Friday? :)

Hi Sara,

I've worked on the document –

Comment one – CHECK.

Comment two – CHECK.
– Inserted the rest of the paragraph – so it is now fully included (p.14)
– BUT – I have not addressed the "chronic" versus "stochastic" issue from Comment #2.

The EPA website (http://www.epa.gov/rpdweb00/understand/health_effects.html) seems to define stochastic as "chronic." So maybe this is acceptable – despite Comment #2's issue with this word choice.

Also –

the beautification process (The EnDyna Half-Day Salon):

– I updated the table of contents – 2.3.3 and 2.6.1 were missing.

– I changed some colors within text boxes and tables (text boxes on Pages 12 and 13)

– I added one space between tables and their titles.

– I deleted one blank page.

Are there any other formatting issues you wanted me to focus on?

Will we have to change the cover to July 2012?

Please feel free to call me or request a call – in case some of what I've done is unnecessary/unhelpful. I'm happy for any criticism or feedback.

Thanks so much,

– Brie
[attachment "Draft 2012 PAG Manual 6-1-2012 v2 - bw.doc" deleted by Sara DeCair/DC/USEPA/US] Draft 2012 PAG Manual 6-1-2012 v2-bw06.29.doc

TX
Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322

From: Sara DeCair
Sent: 11/19/2012 01:58 PM EST
To: Lee Veal
Subject: Re: Re: 70k Pags

No, but we are using NIRT when we can.

-----Lee Veal/DC/USEPA/US wrote: -----
To: Sara DeCair/DC/USEPA/US@EPA
From: Lee Veal/DC/USEPA/US
Date: 11/19/2012 01:55PM
Subject: Re: 70k Pags

Also, are the labs contributing to RAMS work extramurally?
Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322

From: Lee Veal
Sent: 11/19/2012 01:51 PM EST
To: Sara DeCair
Subject: Re: 70k Pags

Now RAMS, we have 60k to start in June. Are we good to spend the 50 that are on there now?

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322

From: Sara DeCair
Sent: 11/19/2012 01:47 PM EST
To: Lee Veal
Subject: Re: 70k Pags

The 70 does not include training, but we have training materials already.... 4 hour workshop, etc. I'll need at least 70k to run the comment period activities.

Since we didn't spend any of the 40k yet, still on hold, I thought Val said it made sense to only ask for 30, assuming we can roll over the previous 40. I'm not clear on which dollars are from when, though.

-----Lee Veal/DC/USEPA/US wrote: -----
To: "Sara DeCair" <DeCair.Sara@epamail.epa.gov>
From: Lee Veal/DC/USEPA/US
Date: 11/19/2012 01:38PM
Subject: 70k Pags

Does this include any training? Also what is the relation to the 40k put on contract in Sept? Should we list PAGS at 70 or 30?
Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
U.S. Environmental Protection Agency
Office 202 343 9448
Cell. 202 617 4322

From: "Tyler A. Willis" <twillis@endyna.com>
To: Sara DeCair/DC/USEPA/US@EPA
Subject: RE: One acronym to change
Submit Time: 5/21/2012 15:41:41

Sara,

Attached is the revised Manual. I have made all edits in tracked changes. Below are a couple of comments for your consideration:

1. I did not delete the SWDA from the acronym list because it was mentioned twice in the document. Ok?

2. Do you want to have a list of abbreviations as well as acronyms? (e.g. rem & mSv)?

3. Section 1.3 has text highlighted yellow, but I am not sure why?

If you need any more help let me know.

Regards,

Tyler A. Willis

Senior Environmental Consultant
twillis@endyna.com

EnDyna, Inc.
7926 Jones Branch Drive, Suite 620
McLean, VA 22102
Tel: (703) 848-8842, ext. 124
Fax: (703) 848-9001
www.endyna.com

From: Sara DeCair [mailto:DeCair.Sara@epamail.epa.gov]
Sent: Monday, May 21, 2012 9:25 AM

To: twillis@endyna.com
Subject: One acronym to change

Tyler,

Instead of SDWA, we should list NPDWR in the Acronyms list. Thank you!

Sara

Draft PAGs-Combined Document 5-21-2012.doc

Submit Time: 5/22/2012 14:42:51
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: twillis@endyna.com
Cc:
Subject: Make new document out of this?

Tyler,

I assume dropping this into a new Word doc might let the file corruption thing go away -- I hope!!

We did away with any double spaces after periods, and cut a bunch of Oxford commas. (Good news when these are the level of edits I'm getting!) So if you'll do a last skim for formatting trouble that I often cause, and send me back a new version, I'd be very grateful!

Thanks so much!

Sara

Draft Planning Guidance and PAGs 5-22-2012.doc

Draft Planning Guidance and PAGs 5-22-2012.doc

Submit Time: 9/25/2012 11:55:09
From: CN=Sara DeCair/OU=DC/O=USEPA/C=US
To: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Jonathan Edwards/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
Subject: Internal: Thoughts on NNPP comments

Alan, Jon,

Here is an updated draft of some thoughts on the NNPP comments, in case any of our leadership gets to discuss these anytime soon. I incorporated a summary section up top, per Alan's suggestion. Thanks for letting me know if there is anything at all I can do!

Sara

Navy Nuke comment responses draft 9-25-2012.docx

Navy Nuke comment responses draft 9-25-2012.docx

To: Hailu Tedla[htedla@health.nyc.gov]; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov)[buddemeier1@llnl.gov]; Musolino, Stephen[musolino@bnl.gov]; Carlos.Corredor@Hq.Doe.Gov[Carlos.Corredor@Hq.Doe.Gov]; Schultheisz, Daniel[Schultheisz.Daniel@epa.gov]
Cc: Mark Maiello[mmaiello@health.nyc.gov]; Jeanine Prudhomme[jprudhom@health.nyc.gov]
From: DeCair, Sara
Sent: Fri 9/27/2013 9:42:32 PM
Subject: RE: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Slides
PAGs in NYC 9-27-2013.ppt

Hailu,

My finalized slides are attached. I still welcome any feedback, if anyone sees anything I should update or adjust, please let me know anytime. I am very hopeful to see all of you on Wednesday!

Sara

Cell 202-738-2871

From: Hailu Tedla [mailto:htedla@health.nyc.gov]
Sent: Monday, September 23, 2013 10:59 AM
To: tammy.taylor@pnnl.gov; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov); Musolino, Stephen; DeCair, Sara; Carlos.Corredor@Hq.Doe.Gov; Schultheisz, Daniel
Cc: Mark Maiello; Jeanine Prudhomme
Subject: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Slides

Dear Symposium Speakers,

Thank you all for sending your slides in accordance with our targeted timeline.

As a matter of standard practice, there will be a quick review by our Bureau and we'll let you know of our questions or comments, if any, by COB Wednesday.

There will also be an opportunity for everyone to see how everyone's slides look like on Thursday at 15:00 EST through a webinar, thanks to Brooke's help to make it a reality.

Looking forward to talk you on Thursday afternoon,

Best regards,

Hailu W. Tedla, MSc, CHP

Health Physicist

Bureau of Environmental Emergency Preparedness and Response

New York City Department of Health and Mental Hygiene

125 Worth Street, Room 315

New York, NY 10013

Tel: (646) 632-6569

Cell: (347) 538-0923

Email: htedla@health.nyc.gov

2013 PAG Manual Revision

Focus on Changes from the 1992 Manual

Sara DeCair, US EPA

October 2013

ED_001057_00013634

Topics to Cover

- Compare 2013 & 1992 Manuals
- Early Phase: Evacuation/Shelter
- Intermediate Phase: Relocation
- Food & Water
- Cleanup: A process, not a number
- Hypothetical cleanup in exercises
- Real cleanup in Japan

ED_001057_00013634

When Do PAGs Apply?

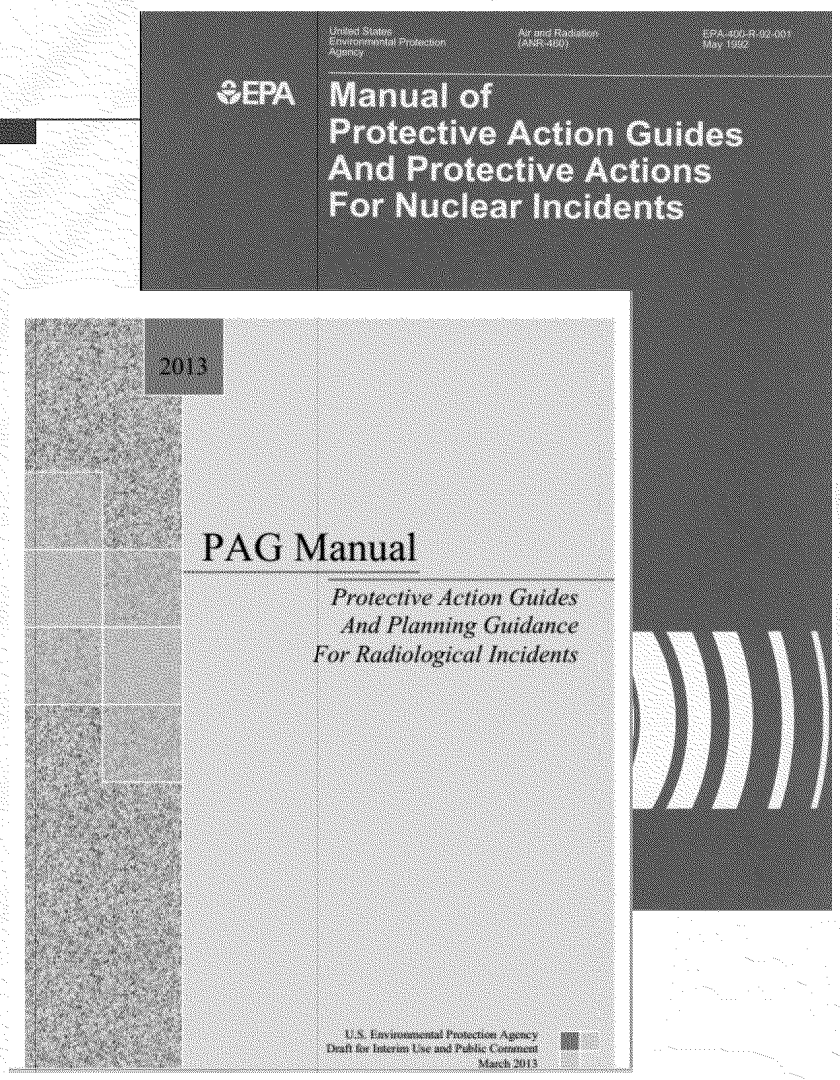
- Public protection is the focus
- Releases, incidents, or accidents
  - ✓ Not for radioactively contaminated sites
- Guidance, not regulatory
- This is not CERCLA or Superfund
- Avoided dose ≠ safe limit to allow

EPA

ED_001057_00013634

PAG Manual

- Protective Action Guides (PAGs) Manual (1992)
- Early, Intermediate Phases only; promised Water and Late Phase (Recovery) PAGs
- Revision issued in 2013



ED_001057_00013634

2013 Draft PAG Manual

- Clarifies the use of PAGs for all radiological incidents, including terrorism
- Lowers projected thyroid dose for KI, via FDA
- Requests input on drinking water guidance
- Refers to 1998 FDA food guidance
- Includes guidance for long-term site restoration
- Updates dosimetry from ICRP 26 to ICRP 60, by referring to FRMAC methods

ED_001057_00013634

Sensitive subpopulations

- Updating to ICRP 60 series
- Age- and gender-specific dose conversions
- Setting PAGs levels
- vs.
- Implementing PAG recommendations
  - ✓ Protective actions apply to whole communities
  - ✓ Conservatism built in
  - ✓ Don’t avoid less dose than intended

ED_001057_00013634

FRMAC Methods by reference

- Readers are referred to FRMAC Assessment Manuals for calculations using up-to-date dosimetry.
  - ✓ Lookup tables of DCFs and DRLs not in PAG Manual
  - ✓ Updated more frequently

ED_001057_00013634

Early Phase

1992	2013
➢ Evacuation/Shelter 1-5 rem (10-50 mSv) ✓ thyroid/skin 5, 50 x higher	➢ Evacuation/Shelter 1-5 rem (10-50 mSv) ✓ (no organ dose specified)
➢ KI 25 rem (250 mSv) thyroid dose (adult)	➢ KI threshold 5 rem (50 mSv) thyroid dose (child)
➢ Worker 5, 10, 25+ rem (50, 100, 250+ mSv)	➢ Worker 5, 10, 25+ rem (50, 100, 250+ mSv)

ED_001057_00013634

Potassium Iodide (KI) Actions

- FDA recommends a multi-pronged approach:

Threshold Thyroid Radioactive Exposures and Recommended Doses of KI for Different Risk Groups				
	Predicted Thyroid exposure(cGy)	KI dose (mg)	# of 130 mg tablets	# of 65 mg tablets
Adults over 40 yrs	≥500	130	1	2
Adults over 18 through 40 yrs	≥10			
Pregnant or lactating women	≥ 5			
Adoles. over 12 through 18 yrs*				
Children over 3 through 12 yrs		65	1/2	1
Over 1 month through 3 years		32	1/4	1/2
Birth through 1 month		16	1/8	1/4

- A simplified approach:
  - ✓ Provide KI to public if 5 rem (50 mSv) child thyroid dose projected
  - ✓ This is a supplemental action where evacuation is the primary protection

ED_001057_00013634

Guidance for Emergency Workers

Dose (rem)	Activity	Condition
5	All	None
10	Protecting valuable property	Lower dose not practicable
25*	Lifesaving or protection of large populations	Lower dose not practicable

* Greater than 25 rem for lifesaving only to volunteers aware of the risks

ED_001057_00013634

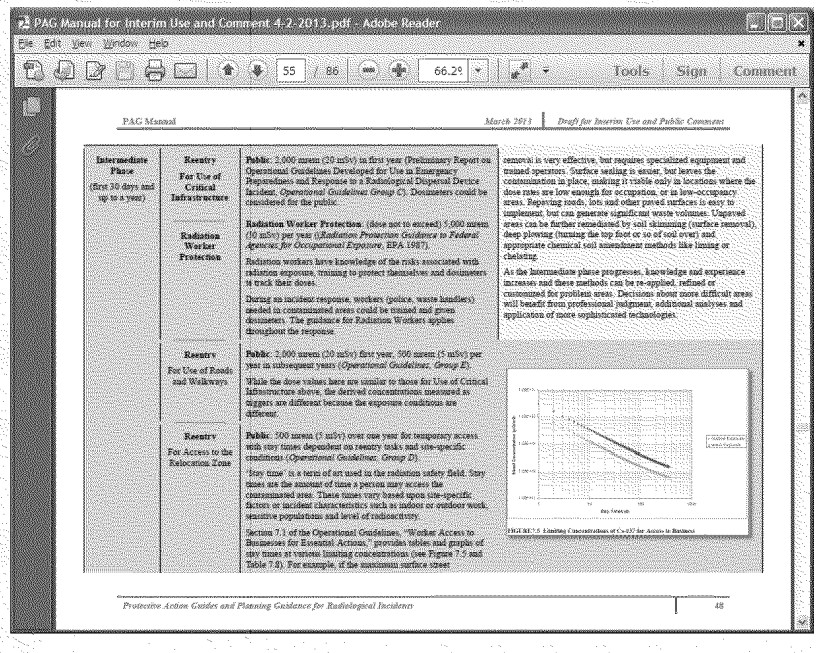
Intermediate Phase

1992	2013
➢ Relocate population ✓ ≥ 2 rem (20 mSv) first year (projected dose) ✓ 0.5 rem (5 mSv) any subsequent year ✓ 5 rem (50 mSv) over 50 yrs ➢ Apply dose reduction techniques ✓ < 2 rem (20 mSv)	➢ Relocate population ✓ ≥ 2 rem (20 mSv) first year (projected dose) ✓ 0.5 rem (5 mSv) any subsequent year ✓ (removed 50-year Relocation PAG) ➢ Apply dose reduction techniques ✓ < 2 rem (20 mSv)

ED_001057_00013634

Re-entry Matrix

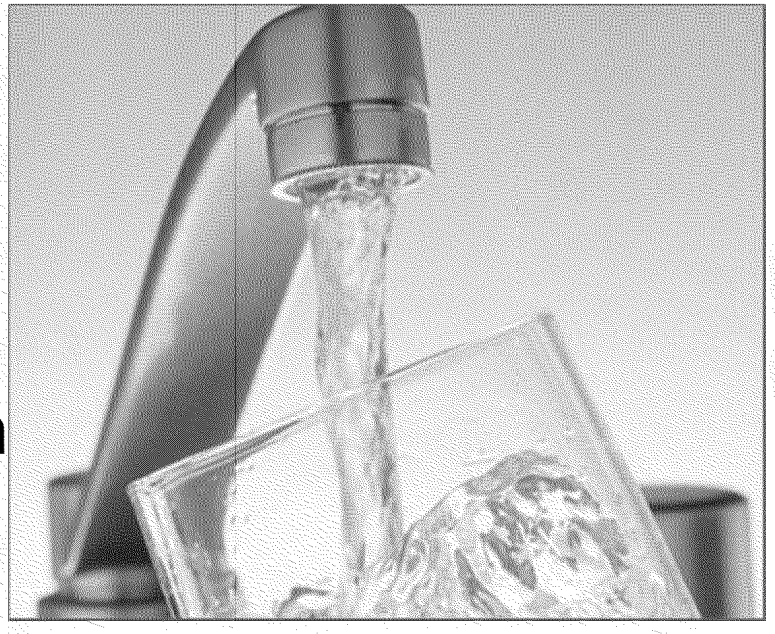
- New quick reference matrix
- Public, workers re-entering Relocation area to work during cleanup
- Basis: Relocation PAGs
- Assumptions: Detailed exposure scenarios in Operational Guidelines
- Do it yourself: RESRAD-RDD software



ED_001057_00013634

Drinking Water PAG

- National Primary Drinking Water Regulations emergency actions: Increased monitoring & notifications
- Comments sought on whether, and what value, an emergency PAG for water should be considered
- Refer to related guides from WHO, IAEA, DHS, FDA



ED_001057_00013634

FDA Food PAGs

1992	2013
➢ 1982 FDA guidance ➢ NCRP 39 methodology ➢ Preventive PAG 0.5 rem (5 mSv) whole body and 1.5 rem (15 mSv) thyroid ➢ Emergency PAG 10 times higher, depends on impact ➢ Dose only, no activity levels provided	➢ 1998 FDA guide, by reference ➢ ICRP 56 & NRPB methods ➢ One set of PAGs ✓ 0.5 rem (5 mSv) whole body dose or ✓ 5 rem (50 mSv) to most exposed organ or tissue ➢ Dose and derived intervention levels (DILs) provided

ED_001057_00013634

Cleanup and Recovery

ED_001057_00013634

Late Phase: Cleanup Goal

- Customer expectation of cleanup goal = background?
- Prescriptive or flexible
- Time, costs, risks, benefits
- Varied legal authorities and funding sources
  - ✓ Depends on the material
  - ✓ Terrorism or not
  - ✓ More than one authority may apply cooperatively

ED_001057_00013634

Benchmarks as starting points

Regulation	Agency[a]	Standard/Numerical limits[b]
General public (10 CFR 20)	NRC	100 mrem/year
Uranium mill tailings (40 CFR 192; 10 CFR 40, App. A)	EPA	Ra-226/228: 5 pCi/g (surface) 15 pCi/g (subsurface) Rn-222: 20 pCi/m^2-sec
High-level waste operations (10 CFR 60)	NRC	100 mrem/year
Low-level waste (10 CFR 61)	NRC	25/75/25 mrem/year
Drinking water (40 CFR 141.15–16)	EPA	Radium: 5 pCi/L Gross alpha: 15 pCi/L (excludes Ra and U) Beta/photon: 4 mrem/year[c] Uranium: 30 µg/L
Uranium fuel cycle (40 CFR 190)	EPA	25/75/25 mrem/year
Air emissions (National Emission Standards for Hazardous Air Pollutants) (40 CFR 61, H)	EPA	10 mrem/year to nearest off-site receptor
Superfund (CERCLA) cleanup (40 CFR 300)	EPA	A risk range of 1:10,000 to 1:1,000,000 (10^{-4}–10^{-6}) excess lifetime risk of getting cancer or ARARs[d]
Decommissioning (10 CFR 20)	NRC	25/100/500 mrem/year
Occupational standards (29 CFR 1910; 10 CFR 20; 10 CFR 835)	OSHA; NRC; DOE	5,000 mrem/year

ED_001057_00013634

Step-wise Process

- Characterization and stabilization
- Establish cleanup goals based on options analysis
- Implementation and reoccupancy

ED_001057_00013634

Decision-Making Organizations

- Focus on process for reaching consensus:
  - ✓ Decision Team – might be requesting funding
    - Senior local, state and federal officials
  - ✓ Recovery Management Team
    - Senior leadership in the field recovery effort
  - ✓ Stakeholder Working Group
    - Community leaders, local businesses, nongovernmental representatives, members of the public
  - ✓ Technical Working Group
    - Select subject matter experts, communicators

ED_001057_00013634

Playing it out: Liberty RadEx

- Used Cleanup Advisory Forum (CAF) process to prioritize post-emergency phase cleanup and develop long-term cleanup strategy
- Technical Advisory Panel (TAP)
- Community Advisory Panel (CAP)

Technical Advisory Panel meeting

EPA

ED_001057_00013634

Far too real: Japan

2. Intensive Contamination Survey Area

Designation of an intensive survey area by the Minister of the Environment

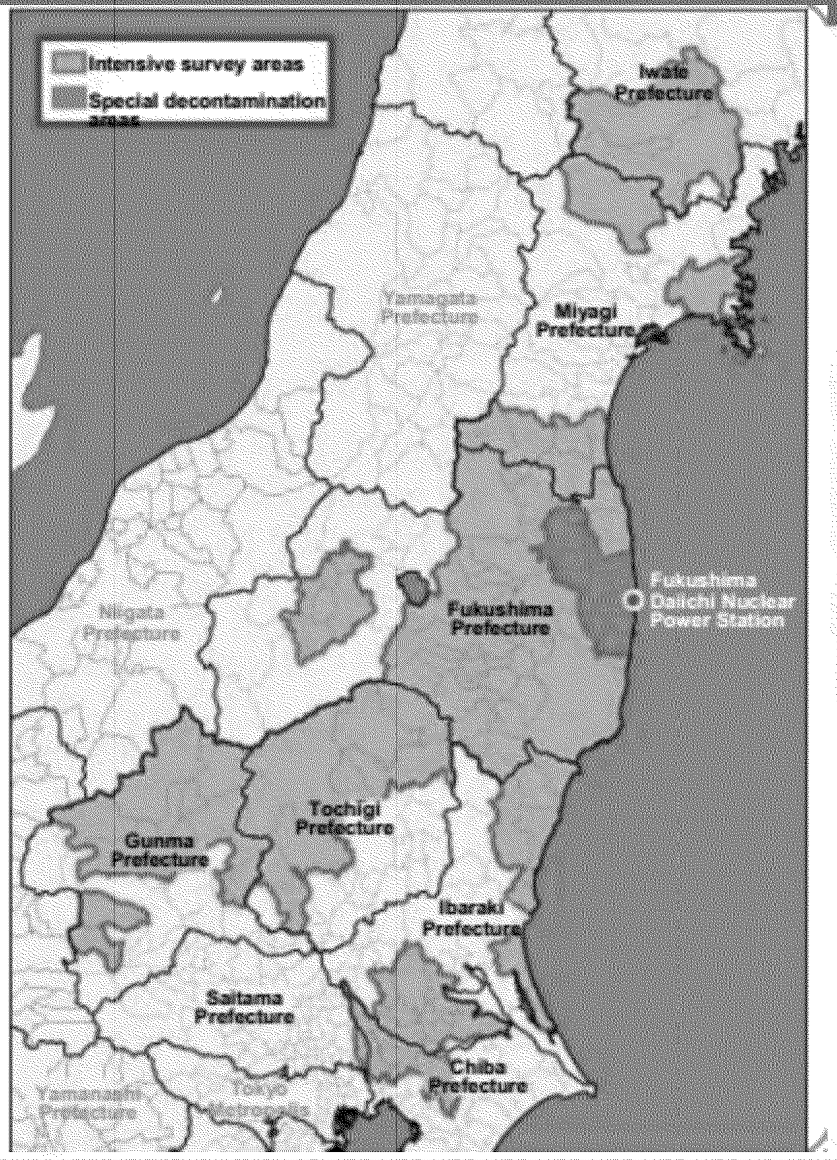
- Areas where the dose rate is over 0.23 μSv/h (equivalent to over 1 mSv/y of additional dose).
- 104 municipalities in 8 prefectures (Iwate, Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, and Chiba).

Surveys and measurement of the contamination status by the heads of the municipalities, etc.

Formulation of decontamination plans by the heads of the municipalities, etc.

Organizations responsible for taking measures
- Land under national control: National government
- Land under prefectural control: Prefectural governor
- Land under municipal control: Head of the municipality
- Land under independent control: Independent administrative agency
- Other land: Head of the municipality

Implementation of decontamination and other measures by the heads of the municipalities, in accordance with their decontamination plans



EPA

ED_001057_00013634

U.S. Case Studies

- Brookhaven National Laboratory, New York
- Enewetak Atoll, Marshall Islands
- Fernald Environmental Management Project, Ohio
- Fort Dix, New Jersey
- Hanford Site, Washington
- Johnston Atoll
- Linde Site, New York
- Nevada Test Site and Associated Ranges, Nevada
- Rocky Flats, Colorado
- Oak Ridge, Tennessee
- Savannah River Site, South Carolina
- Weldon Spring Site, Missouri

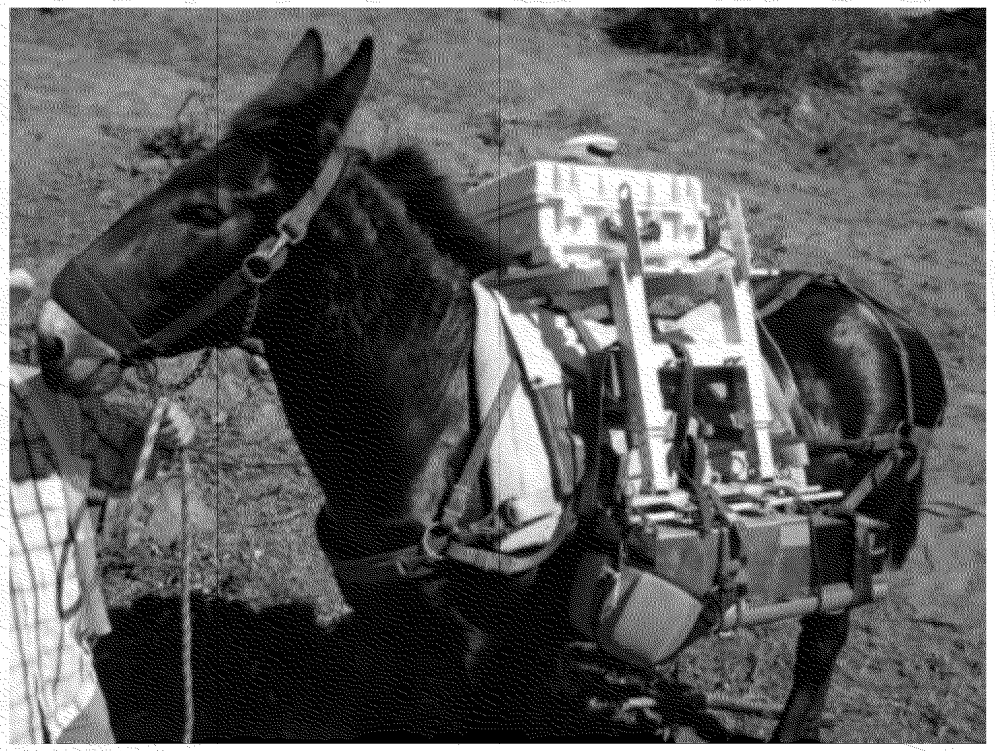
EPA

ED_001057_00013634

Santa Susana

- "Mules Contribute to Cleanup of California Radiation Site"

-- Western Mule Magazine



ED_001057_00013634

Late Phase: Waste Management

- Document focuses on options for disposal
  - ✓ Licensed LLRW disposal facilities
  - ✓ RCRA solid and hazardous waste landfills
  - ✓ Federal facilities/sites
  - ✓ Newly developed disposal capacity
  - ✓ Appropriate for level of hazard
- States bear primary responsibility
  - ✓ Waste volumes will drive decision-making
    - Could overwhelm existing disposal capacity (see Japan)
    - Need to be considered in early planning

ED_001057_00013634

Conclusions

- Compare 2013 & 1992 Manuals
- Early Phase: Evacuation/Shelter
- Intermediate Phase: Relocation
- Food & Water
- Cleanup: A process, not a number
- Next up… Carlos on Operational Guidelines and Dan on Waste Management

ED_001057_00013634

The End

Thank you!

ED_001057_00013634

To: Hailu Tedla[htedla@health.nyc.gov]
Cc: Mark Maiello[mmaiello@health.nyc.gov]; Carlos.Corredor@Hq.Doe.Gov[Carlos.Corredor@Hq.Doe.Gov]
From: DeCair, Sara
Sent: Tue 9/17/2013 3:17:16 PM
Subject: RE: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

I am definitely fine with starting right after lunch, and first doing a comparison of what is different between the 1992 and 2013 PAGs for each phase, and then talking a little bit more about cleanup since that is of great interest to EPA and in Japan right now. Carlos will follow me. He and I are making sure not to duplicate content.

Thanks!

From: Hailu Tedla [mailto:htedla@health.nyc.gov]
Sent: Monday, September 16, 2013 5:13 PM
To: DeCair, Sara
Cc: Mark Maiello
Subject: RE: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Hello Sara,

I left you a message on your voice mail. Here is my take about the flow of the topics:

•□□□□□□□□ Once the morning speakers have covered what happens at the immediate aftermath of a radiological incident, discussions on various phases of PAGs will continue in the afternoon

•□□□□□□□□ The afternoon discussions are expected to cover background ideas in the PAGs in general and their updates, including:

o Rationale for the change

o What the changes are in general and specifics like thyroid dose for children, drinking water, food, dosimetry models, etc.

o What the impacts and the important challenges are

o Etc.

•□□□□□□□□ Even if the PAGs and aspects of the early phase guides might be touched upon by various speakers, a summarized presentation of the PAGs and their updates by EPA is deemed necessary at the beginning of the afternoon session. I reckon this allows a good basis for the rest of the afternoon discussions

•□□□□□□□□ In other words, this will easily connect to the intermediate and late phase recovery discussions and waste management issues

Therefore, as long as the PAGs, their updates and the relevant changes (as I tried to mention in the second bullet) are covered by Carlos I presume there will be no gaps left if you present after him. Please let me know if this sounds reasonable to you or if we need to continue to discuss by phone or via email.

Best regards,

Hailu W. Tedla, MSc, CHP

Health Physicist

Bureau of Environmental Emergency Preparedness and Response

New York City Department of Health and Mental Hygiene

125 Worth Street, Room 315

New York, NY 10013

Tel: (646) 632-6569

Cell: (347) 538-0923

Email: htedla@health.nyc.gov

From: DeCair, Sara [mailto:DeCair.Sara@epa.gov]
Sent: Friday, September 13, 2013 4:45 PM
To: Hailu Tedla; tammy.taylor@pnnl.gov; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov); Musolino, Stephen (musolino@bnl.gov); Carlos.Corredor@Hq.Doe.Gov; Schultheisz, Daniel
Cc: Mark Maiello; Jeanine Prudhomme
Subject: Re:6th Annual Symposium on Protective Action Recommendations Following a

Radiological/Nuclear Incident - Meeting

Happy Friday everyone;

I am wondering if Carlos and I should switch spots on the agenda, since my focus is on the cleanup end of things – and his is Intermediate Phase and Reentry. Thoughts? I do have several points to make about the updated Manual and nuances that have come up recently, but mainly I'm talking about optimization and cleanup case studies.

Thanks for your feedback on that,

Sara

From: Hailu Tedla [mailto:htedla@health.nyc.gov]
Sent: Friday, August 30, 2013 3:30 PM
To: tammy.taylor@pnnl.gov; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov); Musolino, Stephen (musolino@bnl.gov); DeCair, Sara; Carlos.Corredor@Hq.Doe.Gov; Schultheisz, Daniel
Cc: Mark Maiello; Jeanine Prudhomme
Subject: Re:6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Dear Colleagues,

Thank you all for taking part in this afternoon's teleconference and your input in discussing in detail the agenda for our upcoming symposium.

I have attached the agenda after fixing some errors. Please fill free to make any adjustments in your respective topics to better address the content of your presentation.

As discussed, we look forward to receiving your slides by Friday the 20th of September so that we can have a webinar discussion (as suggested by Brooke) probably the following week. In the meantime,

please send me your professional title that I can put in the agenda.

Please do not hesitate to contact Mark or I if you would like to discuss anything in regards to the content of your presentation.

Wishing you an enjoyable Labour Day weekend,

With best regards,

Hailu W. Tedla, MSc, CHP

Health Physicist

Bureau of Environmental Emergency Preparedness and Response

New York City Department of Health and Mental Hygiene

125 Worth Street, Room 315

New York, NY 10013

Tel: (646) 632-6569

Cell: (347) 538-0923

Email: htedla@health.nyc.gov

To: Carlos.Corredor@Hq.Doe.Gov[Carlos.Corredor@Hq.Doe.Gov]
From: DeCair, Sara
Sent: Tue 9/17/2013 12:50:29 PM
Subject: FW: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Of course Hailu now has convinced me that I need to be first, after lunch, to do an overview of the full manual (revised) and then hand it off to you. I will have more cleanup and you'll have more intermediate phase, but below, he pushed back quite a bit.

Let him know if you still want more or less in your title, though!

S.

From: Hailu Tedla [mailto:htedla@health.nyc.gov]
Sent: Monday, September 16, 2013 5:13 PM
To: DeCair, Sara
Cc: Mark Maiello
Subject: RE: 6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Hello Sara,

I left you a message on your voice mail. Here is my take about the flow of the topics:

•□□□□□□□□ Once the morning speakers have covered what happens at the immediate aftermath of a radiological incident, discussions on various phases of PAGs will continue in the afternoon

•□□□□□□□□ The afternoon discussions are expected to cover background ideas in the PAGs in general and their updates, including:

o Rationale for the change

o What the changes are in general and specifics like thyroid dose for children, drinking water, food, dosimetry models, etc.

o What the impacts and the important challenges are

o Etc.

•□□□□□□□□ Even if the PAGs and aspects of the early phase guides might be touched upon by various speakers, a summarized presentation of the PAGs and their updates by EPA is deemed necessary at the beginning of the afternoon session. I reckon this allows a good basis for the rest of the afternoon discussions

•□□□□□□□□ In other words, this will easily connect to the intermediate and late phase recovery discussions and waste management issues

Therefore, as long as the PAGs, their updates and the relevant changes (as I tried to mention in the second bullet) are covered by Carlos I presume there will be no gaps left if you present after him. Please let me know if this sounds reasonable to you or if we need to continue to discuss by phone or via email.

Best regards,

Hailu W. Tedla, MSc, CHP

Health Physicist

Bureau of Environmental Emergency Preparedness and Response

New York City Department of Health and Mental Hygiene

125 Worth Street, Room 315

New York, NY 10013

Tel: (646) 632-6569

Cell: (347) 538-0923

Email: htedla@health.nyc.gov

From: DeCair, Sara [mailto:DeCair.Sara@epa.gov]
Sent: Friday, September 13, 2013 4:45 PM
To: Hailu Tedla; tammy.taylor@pnnl.gov; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov); Musolino, Stephen (musolino@bnl.gov); Carlos.Corredor@Hq.Doe.Gov; Schultheisz, Daniel

Cc: Mark Maiello; Jeanine Prudhomme
Subject: Re:6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Happy Friday everyone;

I am wondering if Carlos and I should switch spots on the agenda, since my focus is on the cleanup end of things – and his is Intermediate Phase and Reentry. Thoughts? I do have several points to make about the updated Manual and nuances that have come up recently, but mainly I'm talking about optimization and cleanup case studies.

Thanks for your feedback on that,

Sara

From: Hailu Tedla [mailto:htedla@health.nyc.gov]
Sent: Friday, August 30, 2013 3:30 PM
To: tammy.taylor@pnnl.gov; 'Buddemeier, Brooke2' (buddemeier1@llnl.gov); Musolino, Stephen (musolino@bnl.gov); DeCair, Sara; Carlos.Corredor@Hq.Doe.Gov; Schultheisz, Daniel
Cc: Mark Maiello; Jeanine Prudhomme
Subject: Re:6th Annual Symposium on Protective Action Recommendations Following a Radiological/Nuclear Incident - Meeting

Dear Colleagues,

Thank you all for taking part in this afternoon's teleconference and your input in discussing in detail the agenda for our upcoming symposium.

I have attached the agenda after fixing some errors. Please fill free to make any adjustments in your respective topics to better address the content of your presentation.

As discussed, we look forward to receiving your slides by Friday the 20th of September so that we can have a webinar discussion (as suggested by Brooke) probably the following week. In the meantime, please send me your professional title that I can put in the agenda.

Please do not hesitate to contact Mark or I if you would like to discuss anything in regards to the content of your presentation.

Wishing you an enjoyable Labour Day weekend,

With best regards,

Hailu W. Tedla, MSc, CHP

Health Physicist

Bureau of Environmental Emergency Preparedness and Response

New York City Department of Health and Mental Hygiene

125 Worth Street, Room 315

New York, NY 10013

Tel: (646) 632-6569

Cell: (347) 538-0923

Email: htedla@health.nyc.gov

To: Wieder, Jessica[Wieder.Jessica@epa.gov]
From: DeCair, Sara
Sent: Mon 9/16/2013 12:53:13 PM
Subject: RE: Getting your help with a NYC talk I'm giving
PAGs in NYC 9-13-2013.ppt

It's weird, isn't it, when your schedule quiets for a moment? How about 1 or 2 pm? Here is my rough draft, and yes, I'll look back at Dana's slides to borrow some language. Thanks much!

S.

From: Wieder, Jessica
Sent: Monday, September 16, 2013 8:18 AM
To: DeCair, Sara
Subject: RE: Getting your help with a NYC talk I'm giving

Hi Sara – My schedule is surprisingly open today. Lets get on a call. I am in the office. Let me know what time works for you. Did you see the presentations that Dana Stalcup gave in Japan? Not sure if they would be any help. Just a thought.

Jess

Jessica Wieder

U.S. EPA

Radiation Protection Program

Public Affairs Specialist

w: 202-343-9201

c: 202-420-9353

From: DeCair, Sara
Sent: Friday, September 13, 2013 1:58 PM
To: Wieder, Jessica

Subject: Getting your help with a NYC talk I'm giving

Jess,

I am drafting a presentation to give at a day-long symposium in NYC on Oct. 2 and I have good guidance on what they want from me (PAGs but mostly cleanup), but I hoped you could help me out with flow of my message and balancing frankness and being informative… is it easier to get on the phone to look through my draft for a bit on Monday (my talk is due Friday next!) or just send you my draft Powerpoint so you can comment on it in your 'spare time' this coming week?

Whichever format is easiest – I have plenty of further reading and research to do to bring them anecdotes about cleanup (namely, Japan) and god forbid I find something to include pictures of – that is always a struggle for me!

Thanks for letting me know your preference…

Sara D. DeCair

http://www.epa.gov/radiation/rert/pags.html

202-343-9108

To: Mckelvey, Laura[Mckelvey.Laura@epa.gov]; Harrison, Jed[Harrison.Jed@epa.gov]; Colon, Toni[Colon.Toni@epa.gov]
From: DeCair, Sara
Sent: Fri 8/23/2013 8:03:40 PM
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

Ours is at 2 pm eastern time. Thanks!

From: Mckelvey, Laura
Sent: Friday, August 23, 2013 12:51 PM
To: Harrison, Jed; Colon, Toni
Cc: DeCair, Sara
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

The only problem is that the GHG for EGU webinar is also Tuesday. What time is your?

From: Harrison, Jed
Sent: Friday, August 23, 2013 12:40 PM
To: Mckelvey, Laura; Colon, Toni
Cc: DeCair, Sara
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

Thanks. That should work. I spoke with Helen at Pechanga (I know she was interested); I guess a lot of folks were at the lands Forum this week.

Jed Harrison SENIOR ADVISOR FOR TRIBAL AFFAIRS
U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION & INDOOR AIR
(702) 784 8218 MOBILE: (702) 494 7050

4220 S. MARYLAND PARKWAY
BLDG. D, SUITE 800
LAS VEGAS, NEVADA 89119

From: Mckelvey, Laura
Sent: Friday, August 23, 2013 9:38 AM
To: Harrison, Jed; Colon, Toni
Cc: DeCair, Sara
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

It won't go out until Monday Toni and Tami are both out on Fridays.

From: Harrison, Jed
Sent: Friday, August 23, 2013 12:37 PM
To: Colon, Toni; Mckelvey, Laura
Cc: DeCair, Sara
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

Toni/Laura-

I just left you both voicemails. Would you all be so kind as to send out a reminder for next Tuesday's webinar to the tribal list serve?

Thanks!

Jed

Jed Harrison SENIOR ADVISOR FOR TRIBAL AFFAIRS
U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION & INDOOR AIR
(702) 784 8218 MOBILE: (702) 494 7030

4220 S. MARYLAND PARKWAY
BLDG. D, SUITE 800
LAS VEGAS, NEVADA 89119

From: Colon, Toni
Sent: Tuesday, July 30, 2013 11:06 AM
Subject: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)
Importance: High

Greetings:

Please tune in for a webinar and discussion on a newly revised Protective Action Guides (PAG) Manual issued by EPA for public review and comment. The PAGs are used to inform radiation emergency response plans to guide evacuation, potassium iodide, relocation and other precautionary actions in case of a radiation incident.

Two webinars offered specifically for our tribal partners will be held on:

August 21: 3:00 pm (eastern); 2:00 pm (central); 1:00 pm (mountain);

12:00 pm (pacific);11:00 am (alaskan)

August 27: 2:00 pm (eastern); 1:00 pm (central); 12:00 pm (mountain);

11:00 am (pacific); 10:00 am (alaskan)

Register ahead of time at www.trainex.org/PAG and you will receive a webinar link and call-in number via email.

The webinar will cover the key changes in the Manual from the 1992 version, and then there will be plenty of time for questions and discussion. The public comment period on this proposed revision closes on Sept. 16th, so we encourage anyone involved with emergency preparedness or radiation protection to review the Manual and provide comments to the docket: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2007-0268-0001

If you have any questions, please contact Sara DeCair at (202) 343-9108, email: declair.sara@epa.gov.

Toni Colón

Communications Specialist

U.S. EPA, Office of Air & Radiation,

Office of Air Quality Planning & Standards,

Outreach & Information Division,

Community & Tribal Programs Group

Tel: (919) 541-0069/**Fax:** (919) 541-0942

Tribal Air Website/OAQPS Tribal Consultation Policy

To: Harrison, Jed[Harrison.Jed@epa.gov]
From: DeCair, Sara
Sent: Fri 8/23/2013 4:38:11 PM
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

Thanks!

From: Harrison, Jed
Sent: Friday, August 23, 2013 12:37 PM
To: Colon, Toni; Mckelvey, Laura
Cc: DeCair, Sara
Subject: RE: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)

Toni/Laura-

I just left you both voicemails. Would you all be so kind as to send out a reminder for next Tuesday's webinar to the tribal list serve?

Thanks!

Jed

Jed Harrison SENIOR ADVISOR FOR TRIBAL AFFAIRS
U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION & INDOOR AIR
(702) 784 8218 MOBILE: (702) 494 7050

4220 S. MARYLAND PARKWAY
BLDG. D, SUITE 800
LAS VEGAS, NEVADA 89119

From: Colon, Toni
Sent: Tuesday, July 30, 2013 11:06 AM
Subject: ANNOUNCEMENT: EPA Webinar on Protective Action Guides (PAG)
Importance: High

Greetings:

Please tune in for a webinar and discussion on a newly revised Protective Action Guides (PAG) Manual issued by EPA for public review and comment. The PAGs are used to inform radiation emergency response plans to guide evacuation, potassium iodide, relocation and other precautionary actions in case of a radiation incident.

Two webinars offered specifically for our tribal partners will be held on:

August 21: 3:00 pm (eastern); 2:00 pm (central); 1:00 pm (mountain);

12:00 pm (pacific);11:00 am (alaskan)

August 27: 2:00 pm (eastern); 1:00 pm (central); 12:00 pm (mountain);

11:00 am (pacific); 10:00 am (alaskan)

Register ahead of time at www.trainex.org/PAG and you will receive a webinar link and call-in number via email.

The webinar will cover the key changes in the Manual from the 1992 version, and then there will be plenty of time for questions and discussion. The public comment period on this proposed revision closes on Sept. 16th, so we encourage anyone involved with emergency preparedness or radiation protection to review the Manual and provide comments to the docket: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2007-0268-0001

If you have any questions, please contact Sara DeCair at (202) 343-9108, email: declair.sara@epa.gov.

Toni Colón

Communications Specialist

U.S. EPA, Office of Air & Radiation,

Office of Air Quality Planning & Standards,

Outreach & Information Division,

Community & Tribal Programs Group

Tel: (919) 541-0069/**Fax:** (919) 541-0942

Tribal Air Website/OAQPS Tribal Consultation Policy

To: Anderson, RobinM[Anderson.RobinM@epa.gov]; Bartenfelder, David[Bartenfelder.David@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
From: Walker, Stuart
Sent: Wed 12/7/2016 8:51:32 PM
Subject: FW: PAGS

fyi

From: Walker, Stuart
Sent: Wednesday, December 07, 2016 3:50 PM
To: Woolford, James <Woolford.James@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>
Cc: Scozzafava, MichaelE <Scozzafava.MichaelE@epa.gov>; Fitz-James, Schatzi <Fitz-James.Schatzi@epa.gov>; Gartner, Lois <Gartner.Lois@epa.gov>
Subject: RE: PAGS

This article and link to the NY AG letter also make for interesting reading

https://insideepa.com/sites/insideepa.com/files/documents/dec2016/epa2016_2535.pdf

Daily News

New York AG Office Urges White House To Reject Water Radiation Guide

December 05, 2016

The New York attorney general's (AG) office is urging the White House to reject a proposed EPA guidance that would set protective drinking water levels for radiological emergencies far in exceedance of Safe Drinking Water Act (SDWA) limits, even as EPA Administrator Gina McCarthy is defending the pending guide and arguing its reach is limited to temporary situations.

The White House Office of Management and Budget (OMB) is reviewing a drinking water chapter slated for inclusion in EPA's protective action guides (PAGs) for radiological emergencies. The agency plans to insert the chapter into an updated PAG manual that McCarthy signed Dec. 1.

EPA chose to finalize the manual now without the drinking water chapter, but

says in a notice that it still plans to finalize the drinking water guidance and intends to add it into the "Intermediate Phase" chapter of the manual and reissue the manual once complete.

The pending drinking water amendments would largely weaken acceptable radiological concentrations allowed in drinking water months or years after a radiological emergency, and dozens of environmental groups have called for the amendments' withdrawal. In addition, several environmental groups in a Nov. 30 letter appealed to McCarthy to meet once again with them to reconsider the water amendments, arguing the draft version “would upend decades of clean water protections.”

An EPA Radiation and Indoor Air Office official, Sara DeCair, told EPA's Clean Air Act Advisory Committee (CAAAC) Dec. 1 that the drinking water amendments are in line to be finalized but gave the caveat that there are no guarantees that will occur under the current administration.

Echoing some of the criticisms levied by environmentalists, the New York AG's office is appealing to OMB to scrap the drinking water guide or alternatively, to send it back to EPA to be reworked, after the agency did not respond to concerns the state raised directly to EPA officials.

While the draft guidance purports to set acceptable radiation levels in public drinking water supplies following a radiological incident, it "advances a much less protective standard for drinking water interdiction than is set forth in existing EPA guidance and in EPA regulations promulgated under [SDWA]," a Nov. 21 letter from New York Assistant AGs Joshua M. Tallent and John J. Sipos says. The letter was sent to OMB Office of Information and Regulatory Affairs (OIRA) Administrator Howard Shelanski.

Potential Exposure

"Because it would substantially, indefinitely, and unjustifiably increase New Yorkers' exposure to radioactive contamination in drinking water in the aftermath of a potential radiological incident, the State of New York Office of the Attorney General strongly urges that OIRA either disapprove the draft guidance now under review or, in the alternative, return the guidance to the EPA for further consideration," the assistant AGs say.

A spokesman for New York Attorney General Eric Schneiderman says he cannot comment on whether the AG's office is considering the possibility of litigation over the PAGs, if EPA issues them without changes.

But McCarthy in response to a question asked during a Nov. 21 National Press Club speech she gave defended the draft water PAG, noting it is to be applied to temporary situations. She stressed that the agency is not altering its drinking water standards, and said the guide applies to a transitional period that would permit exposures temporarily that "would allow life to continue but not present a hazard to those individuals."

"[W]e are providing the best information we can in those transition days, not sending a signal that we think that those numbers should be the standard for drinking water. It clearly shouldn't be," she said at the Washington, D.C., event.

McCarthy said the guide grew out of the 2011 Fukushima, Japan, nuclear power plant accident, where she said people were left not knowing what to do in the aftermath. The larger PAG manual in which the water amendments are slated to be inserted has long been needed by states, according to McCarthy. She said "states have been driven crazy because it's been years since anyone updated [the overall PAG manual] and because they know that we have more at issue now in terms of radiation."

DeCair in slides she presented to the CAAAC indicated that the agency in response to comments revised the draft PAGs to describe "how conservative PAGs levels are" and to further stress "how environmental standards are not changing because of this guidance."

Two-Tiered Approach

In the draft water amendments, EPA proposed a two-tiered approach that would provide more protective exposure levels for sensitive populations than the general population but would still allow radioactivity in drinking water at orders of magnitude beyond SDWA limits for radionuclides.

The amendments would deem protective action dose levels of 500 millirems/year (mrem/yr) in the first year after an incident for the general population, and 100 mrem/yr in the first year for infants, children age 15 and under, and pregnant or nursing women, according to a notice of availability for the draft drinking water PAG. The safety levels would be for emergency management officials to apply in the intermediate phase period after a radiological emergency -- which EPA has at times defined as up to one year but in other cases up to several years after an incident.

Among its criticisms of EPA's draft water PAG, the New York AG's office takes issue with the time period of exposure that citizens near a radiological incident could be subjected to.

The protective action thresholds in the water PAG are meant for use during what is called the intermediate phase of a radiological incident response, which means after the immediate release has been put under control but prior to a large-scale cleanup, the letter notes. In effect, the draft PAGs "create a variance of indeterminate duration from Safe Drinking Water Act standards," it says. This could allow emergency officials to permit citizens to be exposed to levels far exceeding SDWA limits for many months or even years after an incident, it says.

The state AG says what is especially troubling is the agency's "apparent abandonment of the organ dose-based radiation exposure measurement used in the [SDWA maximum contaminant levels (MCLs)] in favor of a measure of exposure expressed as 'committed effective dose.'" EPA in the water PAG does not explain its rationale for the shift in methodology, but due to this change, the water PAG substantially understates "the increase in radionuclide concentrations allowable under the proposed PAGs over [SDWA] levels," it says. For example, EPA would allow a 3,450-fold rise in the maximum allowable concentration of iodine-131, it says.

'Effective Dose'

In the past, EPA has rejected "effective dose" as understating cancer risk, the state AG notes. "Inexplicably, the EPA seems to have adopted PAGs that could expose the public to levels of cancer risk far in excess of what the agency itself considers the maximum acceptable risk threshold," it says.

The state AG also questions EPA's release of "derived response levels" -- the allowable concentrations of each radionuclide in drinking water that correspond to EPA's PAG levels -- for just three of the 100 radionuclides that EPA believes may be found in drinking water systems following an incident.

The complaint echoes concerns voiced by environmentalists who have sued the agency under a Freedom of Information Act lawsuit to obtain the derived response levels for the other radionuclides. Without this data, the state and the public cannot "plausibly evaluate the protectiveness" of the agency's PAGs, the state AG says.

On the procedures side, the state AG also asks OIRA to reevaluate its apparent finding that the water PAG is not a "significant regulatory action," arguing against EPA's label that the PAGs are a nonbinding document.

"[T]he agency clearly intends and expects that federal, state, and local emergency planners will incorporate the draft PAGs into their planning protocols for use in the event of a radiological emergency," the letter says. Further, EPA's

regulatory action could have significant adverse economic, agriculture, homeland security, healthcare and public health and safety impacts, it contends.

Therefore, OIRA should treat the water PAG as a significant regulatory action, subjecting it to the level of review required for such actions, it says. As part of that review, OIRA should scrutinize whether EPA has scientific justification for its claim that the water PAG is within the cancer risk range found in SDWA's MCLs, it says. -- *Suzanne Yohannan* (syohannan@iwpnews.com)

From: Woolford, James
Sent: Tuesday, December 06, 2016 8:24 AM
To: Stalcup, Dana <Stalcup.Dana@epa.gov>
Cc: Scozzafava, MichaelE <Scozzafava.MichaelE@epa.gov>; Walker, Stuart <Walker.Stuart@epa.gov>; Fitz-James, Schatzi <Fitz-James.Schatzi@epa.gov>; Gartner, Lois <Gartner.Lois@epa.gov>
Subject: PAGS

EPA Finalizes Radiological Manual With 1992 Levels Despite Updated Science

December 05, 2016

EPA has quietly released a final guide for responding to radiological incidents, expanding the guide's reach while maintaining many of the protective action levels set in 1992, despite newer scientific findings EPA has adopted for other applications that one environmentalist radiation expert says should have led the agency to set stricter levels.

EPA Administrator Gina McCarthy Dec. 1 signed a notice making available the final Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents, commonly known as the PAG Manual. The manual revises a 1992 version and sets radiological protection criteria for federal, state, local and tribal emergency response officials to use in a wide variety of incidents involving a radiological release.

The agency chose to finalize the manual now without a highly controversial drinking water chapter that is still under interagency review at the White House

Office of Management & Budget (OMB). EPA in the notice says it plans to eventually add the drinking water section to the "Intermediate Phase" chapter of the manual and then reissue the PAG manual. Environmentalists and the New York's attorney general's office have been severely critical of the draft drinking water chapter and have urged EPA to scrap it.

The guidance outlines three radiological incident phases for which it makes protective action recommendations. These are the early phase, the intermediate phase and the late phase. In the early phase, EPA calls for sheltering-in-place or evacuating the public if radioactive levels reach between 1 and 5 roentgen equivalent man (rem) -- a conventional unit used for equivalent dose -- over a four day period following the incident. It also calls for supplementary administration of potassium iodide as a thyroid blocking agent per the latest guidance from the Food & Drug Administration if a child is subjected to 5 rem in the early phase of exposure -- hours to days.

In the intermediate phase, the PAG calls for relocating the public if the projected dose is equal to or greater than 2 rem in the first year, and 0.5 rem in the second and subsequent years. It also includes additional protective dose recommendations depending on food exposures or other circumstances.

For cleanup and waste disposal in the late phase, the manual includes brief guidance for planning the cleanup process and the disposal of radioactive waste, EPA says in a fact sheet issued with the guide.

EPA has expanded the breadth of the guidance from the 1992 version, saying the protective actions described in the manual now apply to a wide range of incidents, although generally to those involving significant radioactive releases. These incidents include nuclear weapons complex or nuclear power plant accidents, a fire in a nuclear fuel manufacturing plant, transportation accidents involving radioactive material or terrorist acts involving a radiological dispersal device.

Questionable Authority

The environmentalist questions the need for such a guidance when the Superfund law already contains authorities to respond to releases, including emergencies. "[D]espite their rote claims to the contrary," the PAG manual undercuts the Superfund law, the source says.

The source says EPA seems "to admit the problem a bit" in a footnote, suggesting it may lack legal authority to issue the PAGs. The source points to a footnote not included in the draft PAG manual, and now repeated throughout the

final that the source says effectively indicates the agency lacks the "legal basis to do any of this." In the footnote to a section on cleanup under the late phase, EPA notes that "this cleanup process does not rely on and does not affect any authority, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), . . . and the National Contingency Plan (NCP)."

It goes on to say: "This document expresses no view as to the availability of legal authority to implement this process in any particular situation."

EPA is stressing that the PAG manual is non-binding, and does not set legal radiation limits or supersede environmental laws or regulations.

In the notice, which in part responds to comments critical of the draft, EPA says the levels established in the manual "are intended to be used only in an emergency when radiation levels have already exceeded environmental standards and could be high enough to cause health effects unless protective actions are taken." The agency contends that PAGs are meant to prevent adverse health impacts by triggering public safety measures such as evacuation and to minimize "unnecessary exposures."

The notice continues, "The PAGs are set at a level where the health risk from radiation exposure that could be avoided with protective action outweighs the risk associated with taking the safety measures, e.g., traffic accidents, trips and falls or anxiety associated with dislocation or the separation of family members."

In response to criticism from environmental groups that the PAGs would not be stringent enough, EPA contends that "[t]here is an abundant conservatism built into the derivation of the PAGs, and into the assumptions used to generate derived response levels, to ensure that the PAGs are appropriate emergency guides for all members of the public, including sensitive subpopulations."

Weaker Standards

But the environmentalist says EPA has effectively weakened the standards, and notes that the details in the manual contradict claims made in the notice and fact sheet.

EPA in the fact sheet says the manual "includes dose calculations based on the latest science." But the source says, "What stunned me is it's exactly the opposite."

The manual says that most of the PAGs and related actions remain unchanged from the 1992 manual. For instance in its basis for early phase PAGs, EPA

references Biological Effects of Ionizing Radiation (BEIR) III, which are now out-of-date cancer and non-cancer risk estimates from exposure to low-level ionizing radiation issued by the National Academy of Sciences (NAS). The source points out that EPA has since adopted more recent NAS findings -- BEIR V and VII -- that show risks are greater than previously estimated for the same level of radiation received. Therefore, the new science shows that levels should be more stringent, the source argues.

This new document contains essentially the same levels as the 1992 document, and is based on science from the 1970s, at the same time EPA is saying it is based on new science, the source says.

Further, EPA weakened the 1992 manual by eliminating certain evacuation requirements triggered when skin and thyroid doses exceed certain levels, the source says. Also, it eliminates a PAG for the intermediate phase that called for relocation if it was projected that the population would accumulate exposure at 5 rem over a 50-year period. EPA in the manual says this was removed for simplicity. The 50-year relocation PAG "is rarely, if ever, the driver for extending a relocation area beyond that prompted by the first or second year relocation PAGs in scenarios that have been analyzed."

In addition, the manual says that "dose projections over 50 years after a radiological incident for various age groups show no significant differences for individuals exposed at 3 months of age versus adult."

The fact sheet also contradicts the manual on the time interval for the intermediate phase, with the former saying it will last weeks to months, while the details included in the manual, including a table that specifies PAG levels, indicate this time period could last up to several years. -- *Suzanne Yohannan* (syohannan@iwpnews.com)

Related News | Toxics | Waste | Water |

196953

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

Office of Land and Emergency Management

US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Our mission is to return the most contaminated areas of country to communities for safe reuse in a healthy environment.

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

To: Stahle, Susan[Stahle.Susan@epa.gov]
From: DeCair, Sara
Sent: Tue 1/3/2017 6:02:50 PM
Subject: FYI, you will be invited to a Mtg re: Water PAGs which Circumvent Safe Drinking Water MCL and Superfund
WATER PAGs 12-18-16 letter to Lisa Christ.pdf
request for EPA Admin McCarthy meeting 11-30-16.pdf

Sue,

Just letting you know you'll be invited to join a pre-brief and a listening meeting regarding the letter and concerns below & attached. Joel Beauvais, Water AA, and their OGC are now being asked to include OLEM staff and OGC, so for completeness we're going to invite you as well. Probably as soon as tomorrow or Thursday!

Meantime, OMB has cleared the water Pag and the intent is to listen to the concerns carefully.

S.

202-343-9108

From: Edwards, Jonathan
Sent: Tuesday, December 20, 2016 4:09 PM
To: Perrin, Alan <Perrin.Alan@epa.gov>; Veal, Lee <Veal.Lee@epa.gov>; DeCair, Sara <DeCair.Sara@epa.gov>; Nesky, Anthony <Nesky.Tony@epa.gov>; Wieder, Jessica <Wieder.Jessica@epa.gov>; Gitlin, Bonnie <Gitlin.Bonnie@epa.gov>
Subject: FW: Ask Admin. McCarthy to Reject Water PAGs which Circumvent Safe Drinking Water MCL and Superfund

FYI

From: Goffman, Joseph
Sent: Tuesday, December 20, 2016 3:04 PM
To: McCabe, Janet <McCabe.Janet@epa.gov>; Edwards, Jonathan <Edwards.Jonathan@epa.gov>
Subject: Fwd: Ask Admin. McCarthy to Reject Water PAGs which Circumvent Safe Drinking Water MCL and Superfund

Sent from my iPhone

Begin forwarded message:

From: "Tim Judson" <timj@nirs.org>
To: "Schmidt, Lorie" <Schmidt.Lorie@epa.gov>, "Goffman, Joseph" <Goffman.Joseph@epa.gov>, "Michaud, John" <Michaud.John@epa.gov>, "Openchowski, Charles" <openchowski.charles@epa.gov>, "Neugeboren, Steven" <Neugeboren.Steven@epa.gov>
Cc: "whauter@fwwatch.org" <whauter@fwwatch.org>, "Catherine Thomasson" <CThomasson@psr.org>, "Damon Moglen" <DMoglen@foe.org>, "Diane D'Arrigo" <dianed@nirs.org>
Subject: Ask Admin. McCarthy to Reject Water PAGs which Circumvent Safe Drinking Water MCL and Superfund

Memo TO: Legal counsel for Radiation, Water and Superfund offices

Joseph Goffman, Office of Radiation and Indoor Air

John Michaud, Solid Waste and Emergency Response Law Office

Steven Neugeboren, Water Law Office

Charles Openchowski, Office of Solid Waste and Emergency Response

Lorie Schmidt, Air and Radiation Law Office

From: Wenonah Hauter, Executive Director, Food and Water Watch

Tim Judson, Executive Director, Nuclear Information and Resource Service

Damon Moglen, Senior Strategic Advisor, Friends of the Earth

Catherine Thomasson, Executive Director, Physicians for Social Responsibility

Cc: Diane D'Arrigo, Radiative Waste Project Director, NIRS

Dear EPA Legal Counsel and Staff:

In the final days of this administration, we implore you to encourage Administrator McCarthy to reject the WATER PAGs-- EPA's Protective Action Guide for Drinking Water (Water PAGs). They are not needed as the Safe Drinking Water Act Maximum

Concentration Levels (mcls) can be used for the "intermediate" phase after an "incident" AND there are water limits in the food portion of the 2016 PAG already.

Our organization and dozens of others including the major national environmental groups have been opposing the Water PAGs since they were first suggested. We have met with EPA staff and are awaiting a requested meeting with Administrator Gina McCarthy before she makes the final decision on them.

We ask for your voice opposing these unnecessary guides which provide an extremely dangerous opportunity to circumvent the Safe Drinking Water mcls, Superfund cleanup levels and the EPA's traditional 1 in a million to 1 in 10,000 allowable cancer risk range. Unless the 2016 PAGs adopted Dec 1, 2016 are changed in numerous places, the addition of the WATER PAG will circumvent these laws and practices.

OMB is poised to release the WATER PAGs at any moment and Administrator McCarthy is expected to approve their insertion into the 2016 PAGs.

Despite assurances to the contrary, the Water PAGs could be applied to relatively routine incidents such as spills and accidents, not just major Fukushima-level disasters or dirty bomb attacks and they could last for "years." Documentation of this is included in the attached letter to Lisa Christ in which we have provided screen shots from the 2016 PAGs that define and describe both "incidents" and the "intermediate phase." Simply dropping the Water PAGs into the 2016 PAGs could enable them to be implemented in this way.

Importantly page 1 Chapter 1 section 1.1 of the 2016 PAGs finalized on December 1, 2016 and published on EPA's website clearly states that the PAGs apply to "any release or potential release into the environment of radioactive materials in sufficient quantity to warrant consideration of protective actions." This indicates they apply to many more incidents than a huge dirty bomb or nuclear power meltdown, indeed essentially any release of radioactivity for which protecting the public should be considered.

The 2016 PAGs clearly and repeatedly identify the "Intermediate" Phase after an "incident" as lasting weeks, months, a year and "subsequent years." We have been told the calculations done for the intermediate phase in the WATER PAGs were done with the assumption that they would only apply for a maximum of one year, but the larger 2016 PAG clearly envisions the possibility of that phase lasting longer. See the references and screen shots in the attached letter.

Finally, we call your attention to a recent investigative piece on the issue by NBC Bay Area, which can be watched at http://www.nbcbayarea.com/investigations/E-P-AS-NEW-EMERGENCY-PLAN-FOR-DRINKING-WATER-CONCERNS-MANY-401206656.html.

For over a decade the public has been commenting and opposing this weakening of radioactive water protection. We ask that you prevent that from happening in the final days of this administration.

Sincerely,

Wenonah Hauter

Executive Director

Food and Water Watch

Tim Judson

Executive Director

Nuclear Information and Resource Service

Damon Moglen

Senior Strategic Advisor

Friends of the Earth

Catherine Thomasson

Executive Director

Physicians for Social Responsibility

Tim Judson

Executive Director

Nuclear Information & Resource Service

6930 Carroll Avenue, Suite 340

Takoma Park, MD 20912

www.nirs.org

O: 301-270-6477

F: 301-270-4291

E: timj@nirs.org

To: Anoma, Valentine[Anoma.Valentine@epa.gov]
Cc: Forinash, Betsy[Forinash.Betsy@epa.gov]
From: Veal, Lee
Sent: Wed 2/5/2014 2:18:58 PM
Subject: PAG comments spreadsheet, for your reading pleasure
EPA PAG Comments_11.20. 2013.xlsx
All PAG Comments except Form Letters-10 21 2013.pdf

Good morning Val,

I am following up to our conversation about the PAG comment assignment. These are the two electronic files that I mentioned.

1. The Adobe Acrobat file "All PAG Comments except Form Letters-10 21 2013.pdf" contains quite literally copies of the PAG comments as they were provided to EPA. These are not sorted.

2. The Excel file "EPA PAG Comments 11 20 2013.xlsx" contains the contractors best attempts at sorting the various comments into topics areas, listed as tabs in the spreadsheet. Instructions for printing are below, but I found it to be challenging to do successfully.

Ex. 5 - Deliberative Process

Lee

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Office: 202-343-9448

Cell: 202-617-4322

www.epa.gov/radiation

From: Danielle Murray [mailto:dmurray@endyna.com]
Sent: Wednesday, November 20, 2013 9:45 AM
To: DeCair, Sara
Cc: siddhanti@endyna.com; Amy Doll
Subject: Printing the Spreadsheet

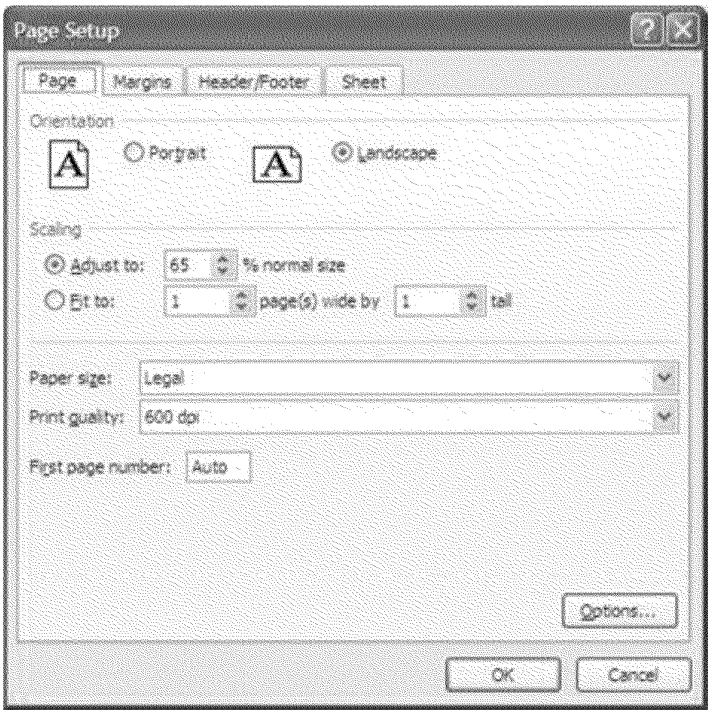
Sara,

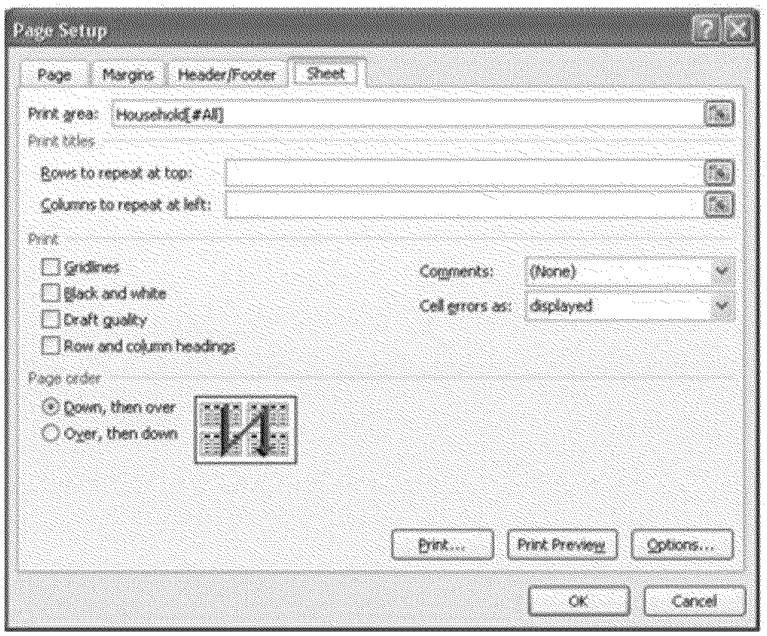
I have completed the requests, and I took this a step further so that you can print any of the tabs that you wish. I will go through the instructions below on how to print them as well.

1. The individual tabs are set so that you can view the entire text in each tab, you will not

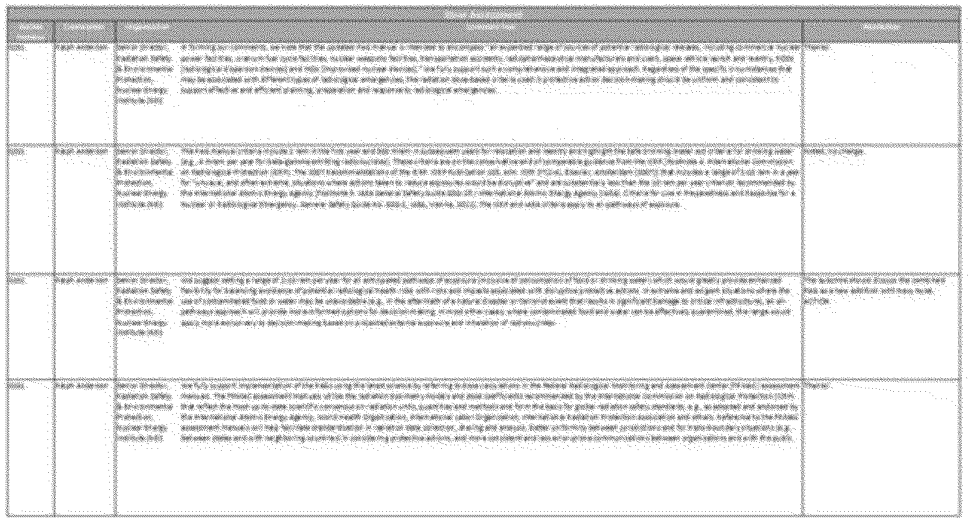
need to change the size (height or width) of any individual cell. Leave these as they are set for printing, but feel free to change them to view them for a meeting.

2. To print the entire work book (print entire workbook), or the individual tabs (print active sheets) please have your printing options set to; legal size, landscape oriented, and 'fit all columns on one page', or 'Adjust to 65% normal size'. I have included what this should look like below.





3. This will allow you to print the spread sheet so that you can view all the necessary information on one sheet of paper. Please see the image below for a print preview once you change your settings to the above in #2.



Thanks, and please do not hesitate at all to call if you have any questions or just want to work through this together.

Danielle Murray

Operations and HR Analyst

EnDyna, Inc.
7926 Jones Branch Drive
Suite 620
McLean, VA 22102

dmurray@endyna.com

703-848-8842 ext.103

703-848-9001 (f)

Protective Action Guides Manual; Updates: Protective Action Guides and Planning Guidance for Radiological Incidents (Document ID EPA-HQ-OAR-2007-0268-0001)

Comments submitted by:

Alan Fellman, Ph.D., CHP
Olney, Maryland
Alan.fellman@moellerinc.com

On page 8, the document states "evacuation of a population of 50,000 carries with it a statistical risk of injury or death from transportation hazards or increased exposure." This statement ignores the data from Fukushima, which proves beyond any doubt that wide-scale evacuation causes disease and fatalities. To date, there are close to 1,000 evacuation related deaths in the population relocated following the accident at Fukushima, from suicide, heart attacks, and other causes. Depression, alcoholism, and other infirmities are highly elevated in the evacuated population. EPA ignores this very real impact on public health.

Section 2.6 on Emergency Response Personnel – EPA establishes a guideline level of 5 rem for emergency responders and acknowledges that higher doses may be unavoidable and incident commanders should have flexibility in their application. On page 26, EPA notes "…incident commanders and other responders need to understand the risk posed by such exposures (in excess of 5 rem) in order to make informed decisions." And for doses greater than 5 rem, EPA states that workers should be made "fully aware of the sub-chronic and chronic risks involved, including numerical estimates of the risk of delayed health effects." These comments are embarrassingly naïve on several levels. It seems that EPA has lost sight of the fact that they are addressing **emergency response personnel**. Who among us can forget the images of first responders running into the remaining World Trade Center tower in an effort to save lives after the first tower collapsed? Three days ago, we all watched the video from the Boston Marathon when, immediately after the explosions, runners and pedestrians were running away from the blasts as the first responders were running toward the blast locations so that they could assist in any way possible. Somehow EPA feels that emergency response workers need to focus on numerical estimates of delayed health effects (which will fall out at a few percent) based on a linear, non-threshold hypothesis that most scientists acknowledge is not quantitative in the dose range under consideration. This only serves to further the radiation phobia that is so prevalent among the general public.

Table 2.2 establishes the numeric guidelines which are unchanged from the previous PAG document, starting with 5 rem for response actions, 10 rem to protect valuable property, and 25 rem for lifesaving. EPA notes that the 25 rem dose "could increase the risk of stochastic effects, such as the risk of cancer." And later states that this guideline should be exceeded "only when the benefits of the action clearly exceed the associated risks." The risk to emergency personnel at the 25 rem level, according to EPA, is 1.5%, or 15 per 1,000 persons. EPA fails to realize here that they are talking about dose to workers involved in **LIFESAVING** operations. Does the New York City fireman run away from the World Trade Center when his/her risk reached 1.5%? I would argue that anyone who would fail to act in an emergency to save a life because his personal risk was 1.5% (even if the risk was real, as opposed to a

hypothetical number based on a widely discredited hypothesis) has no business working as an emergency responder.

Section 2.7 recommends that where the dose limits for the general public are exceeded (no more than 2 mrem in any one hour and 100 mrem in a year), operations should be conducted "under the controlled conditions established for occupational exposure." Unless I'm mistaken, EPA is recommending controlled conditions, similar to restricted areas established by radioactive materials licensees at their facilities, in conditions that might cause a member of the public to receive a dose exceeding 100 mrem in one year. It's not clear what these "controlled conditions" would consist of, but this would seem to have the potential to be a colossal waste of resources. What benefit to the public health would result from such actions? To base policy on the assumption that limited resources are well spent over tens of mrem is disingenuous at best. Similarly, EPA recommends decisions on decontamination of equipment and other items based on a criterion of exceeding two times background. What does society gain by massive decontamination projects for items with two to three times background count rates due to low level surface contamination following a radiological incident? Should people be without the use of their cars and trucks for an indeterminate period of time, waiting for these low levels of surface activity to be removed? Might the resources involved in such efforts be better used elsewhere?

Chapter 3 covers the intermediate phase and establishes recommendations for relocation of the public when doses would exceed 2 mrem in the first year and 0.5 mrem/year in subsequent years. These recommendations are offered despite EPA's acknowledging that relocation is highly disruptive. As noted above, the Fukushima evacuation has, to date, been responsible for almost 1,000 fatalities in the approximately 100,000 persons forced to relocate. At 0.5 rem per year (or doses slightly greater than that), the expected impact on public health is **ZERO**. Yet EPA would prefer to have people abandon their homes, businesses, schools, livelihoods, etc. to "protect" them from a 0.5+ rem annual dose? To put in place recommendations that would lead to similar negative impact on public health, just to save the population from doses in the neighborhood of 0.5 rem per year is indefensible. If I was one of those affected members of the public, I would refuse to evacuate.

Marcus M. Kessler, M.D., Dr.med. (DE)
DABR®, Radiology (AEKNO), MedicalInformatics (AEKNO)
Clinical Instructor
UAMS Radiation Safety Committee Member
UAMS COM Nuclear Medicine PET ServiceCourse Director
Department of Radiology- Division of NuclearMedicine
University of Arkansas for Medical Sciences
4301 W. Markham St. Slot 556
Little Rock, AR 72205

Date: May 08, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Ave NW.
Washington, DC 20460

Attn: Docket ID No. EPA-HQ-OAR-2007-0268
Abstract: Federal Register of April 15, 2013, (78 FR 22257)(FRL-9707-2)
Federal Register Number: 2013-08666
FR Citation: 78
Start-End Page: 22257 - 22260
Comment Start Date: Apr 15, 2013
Comment Due Date: Jul 15, 2013

Dear Madam, dear Sir,

I respectfully submit the following comments for your review and consideration, which I have based on my own review of the literature, as well as on in depth discussions with my colleagues.

1) I request that SI-units be exclusively used or that these are at least given the preference (with Imperial units possibly in parenthesis) throughout the 2013 PAG Manual. Especially Table 2-3 is very confusing in it's use of the unit "R", which is not defined in Appendix B – Glossary.

Rationale: The National Institute of Standards and Technology (NIST) states that: "…Other units outside the SI…should be defined in relation to the SI in every document in which they are used; their continued use is not encouraged." http://physics.nist.gov/cuu/Units/outside.html . All professional societies in Nuclear Medicine (Health Physics Society, SNM, etc.) advocate the sole or preferential use of SI-units.

Continued use of non-SI units contributes to confusion and ambiguity, resulting in significant loss of property (loss of NASA Mars orbiter, http://www.cnn.com/TECH/space/9909/30/mars.metric.02/) and possibly also loss of life given the context of the PAG manual.

2) Request is made to give consideration to revise the recommended dose limit or expand the list of the stated recommended dose limits within Table 2-2, "Response Workers Guidelines" with further guidance on their usage, or to elaborate within the table on the scien tific basis/references of deciding for a very conservative dose limit of 250mSv.

Rationale:

The recommendations of the International Atomic Energy Agency (IAEA), advises on an upper dose limit of 1000 mSv (100 rem) whole body dose for First Responders for life saving actions (Page 41)

http://www-ns.iaea.org/tech-areas/emergency/iec/frg/publications.asp ;

the National Council on Radiation Protection and Measurements recommends an upper limit of 500 mSv (50 rem) http://www.crcpd.org/rdd_handbook/rdd-handbook-forweb.pdf

and the Department of Defense recommends, "…for operations other than war and also based on mission priorities and risk analysis, military commanders limit Operational Exposure Guidance at levels to 75 rad (0.75 Gy) and below". [Note by author: if the 0.75 Gy were secondary to Gamma-radiation, it would result translate into a dose limit of 750 mSv.]

(Planning guidance response to a nuclear detonation, 2010, Page 55, Developed by the National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats [the EPA was one of the participating agencies who published this guidance.] http://www.epa.gov/radiation/docs/er/planning-guidance-for-response-to-nuclear-detonation-2-edition-final.pdf))

All the cited dose limits above, are a factor 2-4 higher than those proposed in the new PAG Manual, and are based on review of the literature. Especially the IAEA dose limit of 1000mSv is very well documented.

Please also note that the proposed PAG Manual contradicts and fails to elaborate on previously issued guidance by the EPA, which suggested a dose limit of 500mSv.

(Planning guidance response to a nuclear detonation, 2010, Page 55, Developed by the National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats [the EPA was one of the participating agencies who published this guidance.] http://www.epa.gov/radiation/docs/er/planning-guidance-for-response-to-nuclear-detonation-2-edition-final.pdf)

3) If decision is made to refrain from following request #2 above, request is made to give Incident Commanders more guidance on the suggested maximum dose in the "Response Workers Guidelines".

The proposed PAG Manual states:

"…in the case of a catastrophic incident, such as an IND, Incident Commanders may need to consider raising the lifesaving and valuable property (i.e., necessary for public welfare) emergency worker guidelines in order to prevent further loss of life and prevent the spread of massive destruction. …"

with no further guidance in the proposed PAG manual as to what the maximum dose limit should be.

A statement in the PAG Manual, structured along the lines of the following guidance by the DOD, would likely help Incident Commanders significantly in their decision making:

"Whereas military commanders set their Operational Exposure Guidance (OEG) (i.e., dose limits to US troops) at any level in nuclear war, the risk analysis for extremely high- priority missions, to include life-saving, yields a maximum OEG of 125 rad (1.25 Gy). For operations other than war and also based on mission priorities and risk analysis, military commanders limit OEG levels to 75 rad (0.75 Gy) and below."

(Planning guidance response to a nuclear detonation, 2010, Page 55, Developed by the National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats [the EPA was one of the participating agencies who published this guidance.] http://www.epa.gov/radiation/docs/er/planning-guidance-for-response-to-nuclear-detonation-2-edition-final.pdf)

4) Request is made to include easy to read colored tables like the ones used here:

http://ctosnnsa.org/vtra/Instruments/CTOS0003aV1.0910_StayTimeTableRadDoseGuid.pdf

into the PAG Manual, as to increase usability and ease-of-use in the field for Incident Commanders during ongoing incidents. Note should however be made that the data should be in SI units, as discussed under #1 above.

5) In regards to the "Response Workers Guidelines", it is hereby suggested that consideration be given to quote Median Lethal Dose LD_5, LD_{30} and LD_{50} values for radiation exposure in the PAG manual, so that Incident Commanders have concrete guidance on the risk vs. benefit of life-saving actions.

Disclaimer: These are my personal opinions and may not reflect the views of my employer. I have no conflicts of interest to declare.

Sincerely,

Signed: MK

Chapter 4, Section 4.1.1, Transitioning from Intermediate to Late Phase Cleanup – This section states that the late phase cleanup process proceeds independently of intermediate phase protective action activities. Whereas this is true of the physical remediation activities it is more efficient if personnel involved in planning the late phase cleanup coordinate in the planning and execution of the intermediate phase cleanup as early as practicable to avoid unnecessary duplication in characterization and to establish a consistent framework for cleanup activities, transportation, and removal of waste. Recommend adding a statement similar to the above to Section 4.1.1.

Section 4.2.1, Potential Waste Volumes and Existing Waste Disposal Options – The penultimate sentence of this section discusses supplements to existing waste disposal capacity. Recommend adding something similar to "establishing a new section or cell to existing commercial or DOE disposal facilities" as a potential alternative for handling large volumes of waste.

Comments from:
Terry Kraus
Sandia National Laboratories
tdkraus@sandia.gov

Page/Chapter/Section	Comment
4/Chapter 1/Section 1.3.4 and other places in the document	Use generic reference for the FRMAC Assessment Manual, don't reference a specific edition such as, "DOE 2010a." I'm not completely sure how the FRMAC Assessment Manual should be referenced but I recommend changing the reference to the FRMAC Assessment Manual throughout the PAG Manual to something like, "FRMAC Assessment Manual (most current version)" and then listing the website in the reference section. The appropriate web site is, http://www.nv.doe.gov/nationalsecurity/homelandsecurity/frmac/manuals.aspx
4/Chapter 1/Section 1.4	I have found that some radiological assessors are unclear whether or not the Intermediate Phase includes the dose from the plume. The 3rd bullet in Section 1.4 states that the Intermediate Phase begins "after the sources and releases have been brought under control (has not necessarily stopped but is no longer growing)" and also states that the Intermediate Phase "may overlap the early phase," Section 2.2 of Chapter 2 states what dose pathways are included in the early Phase and Section 3.2 of Chapter 3 states what dose pathways are included in the Intermediate Phase. Recommend adding a statement to Chapter 3, Section 3.2 that states that the plume pathways dose (inhalation and external exposure from air submersion) is generally not included in the Intermediate Phase dose projections. However in the case of a protracted release that has been brought under control but is still active, the decision makers should consider working with the radiological assessors to include the plume pathways dose in the Intermediate Phase dose projections.
13/Chapter 2/Section 2.1 and Global changes throughout document	The FRMAC Assessment Manual does not use "dose conversion factors" as used in the PAG Manual. To avoid confusion of having PAG Manual users trying to find DCFs in the FRMAC Assessment Manual, recommend the text be changed as follows: "Dose calculations for implementing the PAGs are made using the ~~dose conversion factors (DCFs)~~ Dose Parameters (DPs) and Derived Response Level (DRL) methods referenced in the FRMAC Assessment Manuals ~~(DOE 2010a, b).6"~~
13/Chapter 2/Section 2.2	"Deposited materials can continue to emit beta and gamma radiation as "groundshine" after the plume has passed causing continued exposure to skin and internal body organs." - Per Keith Eckerman (ORNL), some alpha particles are energetic enough to penetrate the dead layer of the skin. This may not be very likely for material deposited on the ground. However to avoid potential

	inconsistencies, recommend rewording as, "Deposited materials can continue to emit "groundshine" (e.g., beta and gamma radiation) after the plume has passed causing continued exposure to skin and internal body organs."
15/ Chapter 2/Table 2-1	The header of the first column of Table 2-1 is "Protective Action Response" and the header of the first column of Table 2-1 is "Protective Action Recommendation." The names of these column names should be consistent.
18/ Chapter 2/Section2.3.3	Can the discussion of the risks of evacuation be updated with data from Hurricane Katrina?
19/ Chapter 2/Section 2.3.4	The FDA recommendations may be clearer to the reader if it was placed in a table.
22/ Chapter 2, Section 2.4.1	I have noticed that many people are confused about the avoidable versus unavoidable dose concept. The current text does not include the term "avoidable dose." The text should state that dose projections for public protection decisions should be based upon the dose that can be avoided (i.e., avoidable dose) by taking some protective action (e.g., evacuation, sheltering). Recommend adding the following sentence between the 2nd and 3rd sentences of the 1st paragraph of Section 2.4.1 to clarify this issue. "Public protection decisions should be based upon the dose that can be avoided (i.e., avoidable dose) by taking some protective action (e.g., evacuation, sheltering)."
24/ Chapter 2/Section 2.4.3	The term "Dose Conversion Factor (DCF) is used. To avoid confusion with the terminology used in the FRMAC Assessment Manual, recommend the following changes: ~~"… A Dose Conversion Factor (DCF) is any factor used to change an environmental measurement to dose in the units of concern. Depending on the exposure pathway, other factors besides the DCF may be required to convert an environmental measurement into a dose."~~ Depending on the exposure pathway, many factors such as ground roughness, weathering and resuspension may be required to calculate the Dose Parameter (DP) that converts an environmental measurement into a projected dose over a given time period (e.g., Early Phase). "The FRMAC Assessment Manuals ~~(DOE 2010a, b)~~[14] provide guidance in calculating DRLs and DPs ~~DCFs~~ based on the ICRP dosimetry models (ICRP 60 series).
33/ Chapter 2/Key Points	Change the following text as shown below: "Dose calculations for PAGs are made using the ~~DCF~~ DP and DRL calculation methods referenced in the FRMAC Assessment Manuals. Emergency response organizations are encouraged to use the most current, applicable tools and methods for implementing the PAGs."

35/ Chapter 3/Section 3.3	Consider adding reference to the FRMAC Assessment Manual as follows: "In most scenarios, relocation decisions will be based on doses from whole-body and internal exposure from inhalation of resuspended contamination. Food and milk ingestion dose should be considered separately with decisions based on the FDA PAGs.[21] The FRMAC Assessment Manual provides guidance in calculating Ingestion Derived Response Levels that indicate the levels of deposited radioactive materials that may result in food exceeding the FDA PAGs."
40/ Chapter 3/Section 3.4.2	Recommend the following change to the first sentence of Section 3.4.2, "The FRMAC Assessment Manuals provide detailed guidance for dose projection and calculating DRLs and ~~DCFs~~DPs (DOE 2010a, b)."
40/ Chapter 3/Section 3.4.2	Near the end of the 2nd paragraph of Section 3.4.2 the discussion of the Strontium-90 RDD infers the need for a skin dose PAG. The PAG Manual no longer has a skin PAG. I'm not sure what the correct solution is but, there seems to be a disconnect here.
46/ Chapter 3/Section 3.7.2	The paragraph that starts, "As part of the U.S. response…" seems to be out of context and doesn't really belong in the PAG Manual. However, if you choose to keep this paragraph, the following statement may be misstated. "DOE's Argonne National Laboratory scientists utilized the RESRAD-RDD tool and hand calculations to approximate the NPP radionuclides." I don't believe RESRAD –RDD was used "to approximate the NPP radionuclides." Wasn't RESRAD-RDD used to estimate the dose from the NPP radionuclides from various activities?
48-49/ Chapter 3/Section 3.8	Recommend not including graphs and tables of specific data unless the text makes clear that these are examples. Including graphs and tables tends to *lock* this data and the readers think that it is always appropriate. The fact is the these data points are frequently updated by changes in dose coefficients, various factors and methods, and this will likely make these graphs and tables quickly obsolete.

OHIO DEPARTMENT OF PUBLIC SAFETY
EDUCATION · SERVICE · PROTECTION

- Administration
- Bureau of Motor Vehicles
- **Emergency Management Agency**
- Emergency Medical Services
- Office of Criminal Justice Services
- Ohio Homeland Security
- Ohio Investigative Unit
- Ohio State Highway Patrol

John R. Kasich, Governor
Thomas P. Charles, Director
Nancy J. Dragani
Executive Director

Emergency Management Agency
2855 West Dublin-Granville Road
Columbus, Ohio 43235-2206
(614) 889-7150
www.ema.ohio.gov

TO: United States Environmental Protection Agency

FROM: Michael L. Bear, Radiological Branch Chief, Ohio Emergency Management Agency MLB

CC: Utility Radiological Safety Board of Ohio
Utility Radiological Safety Board of Ohio Working Group

DATE: June 24, 2013

RE: Comments on Protective Actions Guidance Manual (Docket ID No. EPA-HQ-OAR-2007-0268)

Per the Federal Register announcement of April 15, 2013 I am submitting comments on the revisions to the Protective Action Guidance Manual on behalf of my agency.

- On page 41 the PAG manual refers the reader to the 1992 PAG Manual to see calculations related to the calculation of the ingestion phase limits of 2 REM for the first year limit and 05 REM for subsequent years. Adding these calculations to the new PAG Manual as an attachment or appendix would capture the related information in a single place for ease of use.

- On page 42 the PAG Manual states that radionuclide limits have been determined under the Safe Water Drinking Act (SWDA). Including the applicable portions of the SWDA in an appendix or attachment would be helpful to the reader.

  The EPA should also reconsider the decision not to develop a PAG specifically for drinking water. While the standards laid out in the SDWA and the National Primary Drinking Water Regulations (NPDWR) for Radionuclides may be appropriate for a lifetime exposure calculations, they aren't easily adaptable to emergency situations. The contention that alternate sources of clean water can be obtained and shipped to an area assumes the infrastructure around the affected area is intact. The Fukushima accident demonstrated that areas affected by the radiological emergency could suffer severe infrastructure challenges and that outside sources of water and supplies may not be available. In order to cover all contingencies it would be prudent to have a drinking water PAG developed so we can advise people who only have contaminated drinking water available.

  The focus of the water discussion in the PAG manual is on public water systems. Is this because the EPA does not have jurisdiction over private water sources? If a different federal agency has responsibility for private water sources, have they developed a PAG that could be applied to public water systems if EPA does not develop a drinking water PAG?

- Section 4.6.1 on page 55 provides an example of the late phase following an incident based on a radiological dispersal device (RDD) scenario. This scenario assumes the federal government will be the source of funds for the recovery effort. An example based on a nuclear power accident with a discussion of the fiscal roles played by the utility, American Nuclear Insurers (ANI), and the federal government would be helpful.

- Page 58 of the PAG manual discusses the establishment of technical and stakeholder working groups to advise/concur with proposed clean-up actions. Assuming a nuclear power plant accident, does the guidance envision including utility representatives in these working groups?

Updates to Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents

[EPA–HQ–OAR–2007–0268; FRL–9707–2]

Comments from the Health Physics Society
June 22, 2013

General Comments

The Health Physics Society is pleased to see the publication of the updated Protective Action Guides (PAG) Manual as it applies to different types of radiation emergencies, including acts of terrorism. This long-awaited update to the 1992 version is thorough and clear. The document will be helpful to emergency planners and will be helpful in radiation emergency drills and exercises. The updated dosimetry to ICRP 60, references to the 2009 DOE Operational Guidelines, and the discussion of various waste disposal options all represent useful updates.

The Society would like to highlight two particular issues for improvement. First, the PAG Manual does not include any specific guidance for drinking water for short-term application during an emergency. Instead, the Manual seeks public comment on this issue. The Society is disappointed because the events that unfolded after the Fukushima Daiichi nuclear power plant accident in Japan highlighted the importance of having specific, practical guidelines for drinking water in short-term radiation emergency situations.

Second, the PAG Manual uses the outdated traditional radiation units to communicate the PAGs, and international units are given in parentheses. The Society supports the *exclusive* use of the International System of Units (SI Units) to express radiological quantities.[1] In fact, the National Institute of Standards and Technology (NIST) continues to strongly discourage the use of the old radiological units in the United States. [2] All international organizations and many U.S. organizations such as the National Council on Radiation Protection and Measurements (NCRP) have stopped using the outdated units. Of particular interest, most print and television media in the United States, reporting on the 2011 disaster in Japan, used the current international system of units in their reporting. In case of a radiation emergency in the United States, communication with the public and our international partners and the media will already be challenging. The continued use of outdated units to express radiological

[1] HPS Position Statement 025, "Exclusive Use of SI Units to Express Radiological Quantities," (Feb 2012). http://hps.org/documents/SIunits_ps025-0.pdf

[2] National Institute of Standards and Technology. Metric system of measurement: Interpretation of the International System of Units for the United States. Federal Register 63:40334–40340; 1998.
National Institute of Standards and Technology. The International System of Units (SI). Gaithersburg, MD: National Institute of Standards and Technology; Special Publication 330; 2008a.
National Institute of Standards and Technology. Guide for the use of the International System of Units (SI). Gaithersburg, MD: National Institute of Standards and Technology; Special Publication 811; 2008b.

quantities can have significant repercussions with regard to communication and effective response to radiation emergencies.

The Environmental Protection Agency can use the updated PAG Manual as an opportunity to help our country make the inevitable transition to exclusive use of SI units for radiological quantities. At a minimum, the standard international units should be given first with the outdated units in parentheses.

Specific Comments

Scope - Even though the following points are already stated in the document, it would be helpful to highlight them to avoid misunderstanding or misrepresentation of the PAGs:

- PAGs are for use only in emergencies.
- PAGs are not legal radiation limits, and do not supersede any environmental laws or regulations.
- PAG recommendations do not represent the boundary between safe and unsafe conditions.

Section 2.3.2 – In the bulleted list describing when it is appropriate to shelter-in-place, include the IND incident.

Section 2.3.3 – This section is titled "Considerations for Evacuation and Sheltering in Place" and yet all but the last paragraph is about evacuation. The last paragraph talks about effectiveness of structures as shelters but only as it relates to using them as collection points during evacuation. The title of this section should be revised to "Considerations for Evacuation." Another section titled "Considerations for Sheltering In Place" would be helpful to discuss the importance of sheltering particularly for an IND incident. It would also be helpful in that new section to include more discussion related to Figure 2-1.

Section 2.4.2 – This section emphasizes an incident at a fixed facility. The section could benefit from an expanded discussion to include RDD and IND scenarios.

Section 2.7 – In the last paragraph of this section, it would be helpful to leave some allowance for incidents such as an IND incident when there is a large number of injuries and saving lives or limbs take precedence over contamination issues. Ambulances and other equipment may have to be used although they are contaminated above twice background.

Table 3-1 – While the PAG (Projected Dose) entry in the first row is clear, the entry for the second row <2 rem (20 mSv) does not specify if it is for the first year, the second year, or life-time?

Table 3-1 – A footnote a makes a reference to Section 3.7 to address why these PAGs may not provide adequate protection from some long-lived radionuclides. However, this point is not clear on Section 3.7.

Section 3.5 – For the discussion of PAG for Drinking water, following comments are provided:

- It would be helpful to state that the values established under the Safe Drinking Water Act are based on 70-year lifetime consumption of water at those concentrations.
- The document says in multiple sections that "the Agency recognizes a short-term emergency drinking water guide <u>may</u> be useful for public health protection" in a radiation emergency.

[emphasis added] The fact is that a short-term emergency guide is an absolute necessity in a radiation emergency that impacts sources of drinking water. Lack of such guidance may cause undue concern for the public.

- For drinking water interdiction during the intermediate phase of a radiation emergency, the 5 mSv projected dose in the first year, suggested by the Department of Homeland Security in 2008 is a useful guidance.[3] However, a guidance which is based on a shorter duration of consumption will also be useful and practical.

Section 3.7 – Reentry during Intermediate Phase - it would be helpful to mention that stakeholders should be involved in reentry decisions, whenever they occur.

Section 4.1.6. b) The third paragraph states: "*Preliminary remediation activities during the intermediate phase- such as emergency removal, decontamination, resumption of basic infrastructure function and some return to normalcy in accordance with intermediate phase PAGs – should not be delayed for the final site remediation decisions.*" We agree on the importance of this principle, and believe that it will help in the recovery of local communities and their economy. It would help to highlight this as a Key Point for Chapter 4.

[3] 73 FR 45029 - Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents, August 1, 2008.
http://ogcms.energy.gov/73fr45029.pdf

AMERICAN THYROID ASSOCIATION
FOUNDED 1923

2012-2013

President
Bryan R. Haugen, M.D. (2012-2013)
Denver, Colorado

Secretary/Chief Operating Officer
John C. Morris, M.D. (2011-2015)
Rochester, Minnesota

Treasurer
David H. Sarne, M.D. (2007-2013)
Chicago, Illinois

President-Elect
Hossein Gharib, M.D. (2012-2013)
Rochester, Minnesota

Treasurer-Elect
Gregory W. Randolph, M.D. (2012-2013)
Boston, Massachusetts

Past-President
James A. Fagin, M.D. (2012-2013)
New York, New York

Directors
Peter A. Kopp, M.D. (2009-2013)
Chicago, Illinois

Elizabeth N. Pearce, M.D. (2009-2013)
Boston, Massachusetts

Victor J. Bernet, M.D. (2010-2014)
Jacksonville, Florida

Gerard M. Doherty, M.D. (2010-2014)
Boston, Massachusetts

Sissy M. Jhiang, Ph.D. (2010-2014)
Columbus, Ohio

Erik K. Alexander, M.D. (2011-2015)
Boston, Massachusetts

Martha A. Zeiger, M.D. (2011-2015)
Baltimore, Maryland

James V. Hennessey, M.D. (2012-2016)
Boston, Massachusetts

Susan A. Sherman, M.D. (2012-2016)
Aurora, Colorado

Executive Director
Barbara R. Smith, CAE

Headquarters' Office
American Thyroid Association
6066 Leesburg Pike, Suite 550
Falls Church, Virginia 22041
Phone: 703 998-8890
Fax: 703 998-8893
E-mail: bsmith@thyroid.org
Web: www.thyroid.org

July 5, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Docket ID No. EPA-HQ-OAR-2007-0268

Dear Sir or Madam:

We are writing on behalf of the American Thyroid Association (ATA) in response to your request for comments (Fed Reg 78 FR 22257, 04/15/2013) regarding the EPA's ***Protective Action Guides (PAG) Manual; Updates: Protective Action Guides and Planning Guidance for Radiological Incidents***. The ATA represents the largest and most established group of physicians dedicated to the study of the thyroid gland and its disorders. The leading worldwide organization dedicated to the advancement, understanding, prevention, diagnosis, and treatment of thyroid disorders and thyroid cancer, the ATA is an international individual membership organization with over 1,600 members from 43 countries around the world.

There are two concerns related to potassium iodide (KI) that we are believe are important and not sufficiently addressed in the current draft of the PAG manual. KI is a safe and effective protective measure against the harmful thyroidal effects of radioactive iodine release.

1. The ATA favors KI predistribution so that KI would be immediately available in the event of a nuclear accident. Sections 2.3.4 and 2.3.5 of the PAG manual should be amended to include the option of predistribution to facilitate timely KI administration. The ATA advocates KI as an essential adjunct to evacuation, sheltering, and avoiding contaminated food, milk, and water.

2. We would note that the 2004 National Academies of Science report (National Research Council o*f the National Academies.* Distribution and Administration of Potassium Iodide in the Event of a Nuclear Incident. Washington, DC: The National Academies Press, 2004) discussed KI distribution strategies in detail and is an important reference to cite.

Sincerely,

Bryan R. Haugen, MD
President, ATA

John C. Morris, III, MD
Secretary/COO, ATA

Angela M. Leung, MD
Chair, ATA Public Health Committee

Elizabeth N. Pearce, MD
Board Liaison, ATA Public Health Committee

PILGRIM WATCH COMMENT PAG MANUAL MARCH 2013 DRAFT FOR INTERIM USE AND PUBLIC COMMENT

Mary Lampert
Pilgrim Watch, Director
148 Washington Street
Duxbury, MA 02332
Tel. 78`-934-0389
Email mary.lampert@comcast.net
July 9, 2013

TABLE CONTENTS

Introduction	1
Early-Intermediate-late Phase PAGs Meteorological Modeling Real-Time Offsite Radiological/Meteorological Monitors Environmental Sampling	2
Early-Intermediate-late Phase PAGs Planning Guidance and Protective Action Guide for Radiological Incidents	12
Early Phase PAGs Planning Guidance and PAGs Potassium Iodide Face Masks Reception Centers	15
Intermediate Phase PAGs Relocation Decontamination, Clean-up Drinking Water Standards	18
Late Phase PAGs Who is in Charge Who Pays	27

PILGRIM WATCH COMMENT PAG MANUAL (MARCH 2013) DRAFT FOR INTERIM USE AND PUBLIC COMMENT [Docket ID No. EPA-HQ-OAR-2007-0268]

July 9, 2013

I. INTRODUCTION

EPA's Draft PAG provides radiological protection criteria (PAGs and protective actions) for application to all incidents that would require consideration of protective actions, with the exception of nuclear war.

The PAG says that the "PAGs are not legally binding regulations or standards and do not supersede any environmental laws." However state and local responders treat the Manual as the Gospel and this should be recognized.

The Draft PAG Manual should make clear, but does not, what specific regulations or standards require beside the PAG Manual Guidance. A simple table should be included in the final document laying out side by side the PAGs and all other pertinent standards, as opposed to only footnotes providing links to those standards, as in the draft.

The PAG Manual divides into three sections: Early Phase Protective Action Guides; Intermediate Phase Protective Action Guides; and Late Phase Protective Action Guides. EPA's draft largely provides simply a broad-brushed description of radiological emergency plans at each stage; and not enough attention is given to what the plans <u>should be</u> in order to reflect lessons learned from Fukushima and to protect public health and the environment. The EPA Draft Manual guidance is inadequate in the following areas.

- Meteorological plume modeling, real-time offsite radiological air monitors, environmental sampling
- Dose Guidance
- Potassium Iodide
- Cleanup

II. METEOROLOGICAL PLUME MODELING; REAL-TIME OFFSITE RADIATION/METEOROLOGICAL AIR MONITORING STATIONS; ENVIRONMENTAL SAMPLING - EARLY, INTERMEDIATE, LATE PHASE PROTECTIVE ACTION GUIDANCE

The PAG Manual provides radiological protection criteria for application to all incidents that would require consideration of protective actions. In order to make the correct protective action call (evacuate, shelter, administration KI, interdiction of food/milk/water) and properly assess what areas require cleanup and population relocation requires:

- advanced and site-appropriate meteorological plume models;
- the availability of real -time meteorolo gical/radiological monitors located in the near and far field; and
- Timely and reliable environmental monitoring.

The PAG Draft Manual does not, as it should provide proper specific guidance in these three areas.

A. Meteorological Plume Modeling- Outdated Gaussian Model v. Advanced Variable Models

The EPA Draft PAG missed the opportunity to plainly state that advanced meteorological models[1] should be used. The draft dances around the issue but never comes straight out with a definite recommendation, as it should in the final PAG Manual.

a. Today, the out -dated straight-line Gaussian plume is used by licensees and federal/state emergency planners. It will not provide the information required to make correct protective action decisions. The Gaussian plume model assumes that a release d radioactive plume travels in a steady-state straight-line, i.e., the plume functions much like a beam from a flashlight. The choice of a straight -line Gaussian plume rather than a variable trajectory model drastically reduces, to a wedge, the size of th e area that might potentially be impacted by a release. It has been known by government and independent agencies for a long time that the assumption of a steady-state, straight -line plume is inappropriate when complex inhomogeneous wind flow

[1] See Draft PAG at, fr example pgs., 13,21,22,23,24,37,40

ED_001057_00026684

patterns happen to be prevailing in the affected region – such as in hilly and mountainous terrain, along rivers that channel the plume and along wide bodies of waters where, for example, the sea breeze effect occurs.

Sea breeze : There is a misconception that the sea b reeze is generally a highly beneficial phenomenon that disperses and dilutes the plume concentration and thereby lowers the projected doses downwind from the release point. However, if the same meteorological conditions (strong solar insolation, low synoptic-scale winds) that are conducive to the formation of sea breezes at a coastal site occurred at a non coastal location, the resulting vertical thermals developing over a pollution source would carry contaminants aloft. In contrast, at a coastal site, th e sea breeze draws contaminants downward across the land and inland subjecting the population to larger doses and at greater distance.

Behavior Plumes over Water : Also Planning should, but does not, reflect understanding of the flow of air over and arou nd large bodies of water. As an example at Pilgrim, located on New England's Coastline, winds initially headed out to sea will remain tightly concentrated due to reduced turbulence over water until the winds blow the puffs back over land. [2] This can lead to hot spots of radioactivity in unexpected places – beyond 10 miles that should be instructed and prepared to take protective actions.

Meteorological Modeling: Government and Independent Studies

EPA has been a leader in advanced meteorological studies. Al so other government and independent studies support that a straight line Gaussian plume model cannot account for the effects of complex terrain on the dispersion of pollutants from a source. Therefore the final EPA PAG should make this clear – not simply ignore or skirt the issue.

---

[2] Zager M, Tjernstrom M, Angevine W. 2004, New England coastal boundary layer modelin g. In: AMS 16th Symposium on boundary Layers and Turbulence, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Senff CJ, White AB. 2004. Coastal Boundary layer Transport of urban pollution in New England In: 16th Symposium of boundary layers and tur bulence Portland, Maine, 13th Symposium on Turbulence and diffusion, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Zager M. 2006. Modeling of the Coastal Boundary Layer and Pollutant Transport in New England, J. of Appl. Meteorol. & Climatol. 4 5: 137-154. Scire JS, Strimaitis DG, Yamatino RJ. 2000 A User's Guide for the CALPUFF Dispersion Model (Version 5). Concord MA: Earth Tech, Inc.

ED_001057_00026684

EPA

EPA recognized the need for complex models. For example: EPA's 2005 Guideline on Air Quality Models says in Section 7.2.8 *Inhomogenous Local Winds* that,

> In very rugged hilly or mountainous terrain, along coastlines, or near large land use variations, the characterization of the winds is a balance of various forces, such that the assumptions of steady-state straight line transport both in time and space are inappropriate. (Fed. Reg., 11/09/05).

EPA goes on to say that, "In special cases described, refined trajectory air quality models can be applied in a case-by-case basis for air quality estimates for such complex non-steady-state meteorological conditions." This EPA Guideline also references an EPA 2000 report, *Meteorological Monitoring Guidance for Regulatory Model Applications,* EPA-454/R-99-005, February 2000. Section 3.4 of this Guidance for coastal locations, discusses the need for multiple inland meteorological monitoring sites, with the monitored parameters dictated by the data input needs of particular air quality models.

Most important, EPA's November 2005 Modeling Guideline (Appendix A to Appendix W) lists EPA's "preferred models" and the use of straight line Gaussian plume model, called ATMOS, is not listed. Sections 6.1 and 6.2.3 discuss that the Gaussian model is not capable of modeling beyond 50 km (32 miles) and the basis for EPA to recommend CALPUFF, a non-straight line model.[3]

NRC

Since the 1970s, the USNRC too has historically documented advanced modeling technique concepts and potential need for multiple meteorological towers appropriately located in offsite communities, especially in coastal site regions. But ignored implementing its' own advice.

[3] http://www.epa.gov/scram001/guidance/guide/appw_05.pdf

ED_001057_00026684

In 2009, the NRC made a presentation to the National Radiological Emergency Planning Conference;[4] and although it was focused on emergency planning, the content is equally relevant to meteorological modeling for consequence analysis. The presentation concluded that the straight-line Gaussian plume models cannot accurately predict dispersion in a complex terrain and are therefore scientifically defective for that purpose [full presentation is available at ML091050226, ML091050257, and ML091050269 (page references used here refer to the portion attached, Part 2, ML091050257). Exhibit 19

Most reactors, if not all, are located in complex terrains, including Pilgrim. In the presentation, NRC said that the "most limiting aspect" of the basic Gaussian Model, is its "inability to evaluate spatial and temporal differences in model inputs" [Slide 28]. Spatial refers to the ability to represent impacts on the plume after releases from the site e.g., plume bending to follow a river valley or sea breeze circulation. Temporal refers to the ability of the model to reflect data changes over time, e.g., change in release rate and meteorology [Slide 4].

Because the basic Gaussian model is non-spatial, it cannot account for the effect of terrain on the trajectory of the plume – that is, the plume is assumed to travel in a straight line regardless of the surrounding terrain. Therefore, it cannot, for example, "'curve' a plume around mountains or follow a river valley." NRC 2009 Presentation, Slide 33. Entergy acknowledges that within 50-miles from Pilgrim there are hills and river valleys. Further it cannot account for transport and diffusion in coastal sites subject to the sea breeze. Sea breeze also applies to any other large bodies of water. The sea breeze causes the plume to change direction caused by differences in temperature of the air above the water versus that above the land after sunrise. If the regional wind flow is light, a circulation will be established between the two air masses. At night, the land cools faster, and a reverse circulation (weak) may occur [Slide 43]. Turbulence causes the plume to be drawn to ground level [Slide 44].

The presentation goes on to say that, "Additional meteorological towers may be necessary to adequately model sea breeze sites" [Slide 40].

[4] What's in the Black Box Known as Emergency Dose Assessment (ML091050226), 2. Dispersion (ML091050257), 3. Dose Calculation (ML091050269), 2009 National Radiological Emergency Planning Conference, Stephen F. LaVie

ED_001057_00026684

Significantly, the NRC 2009 Presentation then discussed the methods of more advanced models that *can* address terrain impact on plume transport, including models in which emissions from a source are released as a series of puffs, each of which can be carried separately by the wind, (NRC 2009 Presentation Slides 35, 36). This modeling method is similar to CALPUFF. Licensees are not required, however, to use these models in order to more accurately predict where the plume will travel to base either consequence analyses or protective action recommendations.

The NRC recognized as early as 1977 that complex terrain presented special problems that a model must address if the air dispersion analysis is to be accurate. [5] For example: NRC, Regulatory Guide 1.111, *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light -Water-Cooled Reactors* (July 1977) (Draft for Comment) says that, "Geographic features such as hills, valleys, and large bodies of water *greatly* influence dispersion and airflow patterns. Surface roughness , including vegetative cover, affects the degree of turbulent mixing." (Emphasis added).

<u>This is not new information; knowledge of the inappropriateness of straight-line Gaussian plume in at complex sites goes back a long way within NRC. For example:</u>

1972: NRC Regulatory Guide 123 (Safety Guide 23) On Site Meteorological Programs 1972, states that, "at some sites, due to complex flow patterns in non -uniform terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary."

1977: NRC began to question the feasibility of using straight line Gaussian plume models for complex terrain. *See* U.S.NRC, 1977, Draft for Comment Reg. Guide 1.111 at 1c (pages 1.111 -9 to 1.111-10)

1983: In January 1983, NRC Guidance [NUREG-0737, Supplement 1 "Clarification of TMI Action Plan Requirements," January 1983 Regulatory Guide 1.97 - Application to Emergency Response Facilities; 6.1 Requirements], suggested that changes in on -site meteorological monitoring systems would be warranted if t hey have not provided a reliable indication of monitoring conditions that are representative within the 10-mile plume exposure EPZ.

[5] Ibid

ED_001057_00026684

1996: The NRC acknowledged the inadequacy of simple straight -line Gaussian plume models to predict air transport and disper sion of a pollutant released from a source in a complex terrain when it issued RTM -96, *Response Technical Manual,* which contains simple methods for estimating possible consequences of various radiological accidents. In the glossary of that document, the NR C's definition of "Gaussian plume dispersion model" states that such models have important limitations, including the inability to "deal well with complex terrain." NUREG/BR-0150, Vol.1 Rev.4, Section Q; ADAMS Accession Number ML062560259,

2004: A NRC rese arch paper, *Comparison of Average Transport and Dispersion Among a Gaussian, A Two- Dimensional and a Three-Dimensional Model*, Lawrence Livermore National Laboratory, October, 2004 at 2. ("Livermore Report") had an important caveat added to the Report's summary about the scientific reliability of the use of a straight -line Gaussian model in complex terrains:

> . . . [T]his study was performed in an area with smooth or favorable terrain and persistent winds although with structure in the form of low -level noc turnal jets and severe storms. In regions with *complex terrain* , particularly if the surface wind direction changes with height, *caution should be used.* Livermore Report at 72 (Emphasis added)

2005: In December, 2005, as part of a cooperative program betwe en the governments of the United States and Russia to improve the safety of nuclear power plants designed and built by the former Soviet Union, the NRC issued a Procedures Guide for a Probabilistic Risk, related to a Russian Nuclear Power Station. The Guid e, prepared by the Brookhaven National Laboratory and NRC staff, explained that atmospheric transport of released material is carried out assuming Gaussian plume dispersion, which is "generally valid for flat terrain." However, the Guide the caveat that in "specific cases of plant location, such as, for example, a mountainous area or a valley, more detailed dispersion models may have to be considered." *Kalinin VVER -1000 Nuclear power Station Unit 1 PRA, Procedures Guide for a Probabilistic Risk Assessment,* NUREG/CR- 6572, Rev. 1 at 3 -114; excerpt attached as Exhibit 8, full report available at http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6572. Exhibit 20

ED_001057_00026684

2007: NRC revised their Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants. On page 11, the section entitled *Special Considerations for Complex Terrain Sites* says that, "At some sites, because of complex flow patterns in nonuni form terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary. For example, the representation of circulation for a hill-valley complex or a site near a large body of water may need additional measuring poin ts to determine airflow patterns and spatial variations of atmospheric stability. Occasionally, the unique diffusion characteristics of a particular site may also warrant the use of special meteorological instrumentation and/or studies. The plant's operational meteorological monitoring program should provide an adequate basis for atmospheric transport and diffusion estimates within the plume exposure emergency planning zone [i.e., within approximately 16 kilometers" (10 miles)].[6]

These excerpts from Regula tory Guide 1.23 demonstrate that the NRC recognizes there are certain sites, such as those located in coastal areas, like Pilgrim, that multiple meteorological data input sources are needed for appropriate air dispersion modeling. Not simply one or two meteorological towers onsite. Since the straight -line Gaussian plume model is incapable of handling complex flow patterns and meteorological data input from multiple locations, Regulatory Guide 1.23 demonstrates NRC's recognition that it should not be used at any site with complex terrain.

DOE

DOE, too, recognizes the limitations of the straight -line Gaussian plume model. They say for example that Gaussian models are inherently flat-earth models, and perform best over regions of transport where there is minima l variation in terrain. Because of this, there is inherent conservatism (and simplicity) if the environs have a significant nearby buildings, tall vegetation, or grade variations not taken into account in the dispersion parameterization.[7]

[6] For example, if the comparison of the primary and supplemental meteorological systems indicates convergence in a lake breeze setting, then a "keyhole" protective action recommendation (e.g., evacuating a 2-mile radius)
[7] the MACCS2 Guidance Report June 2004 Final Report, page 3-8:3.2 Phenomenological Regimes of Applicability

ED_001057_00026684

National Research Council

Tracking and Predicting The Atmospheric Dispersion of Hazardous Material Releases Implications for Homeland Security, Committee on the Atmospheric Dispersion of Hazardous Material Releases Board on Atmospheric Sciences and Climate Division on Earth and Life Studies, National Research Council of the National Academies, 2003. The report discusses how the analytical Gaussian models were used in the 1960s and tested against limited field experiments in flat terrain areas performed in earlier decades.

In the 1970s the US passed the Clean Air Act which required the use of dispersion models to estimate the air quality impacts of emissions sources for comparison to regulatory limits. This resulted in the development and testing of advanced models for applications in complex terrain settings such as in mountainous or coastal areas. In the 1980s, further advances were made with Lagrangian puff models and with Eulerian grid models. Gaussian models moved beyond the simple use of sets of dispersion coefficients to incorporate Monin-Obukhov and other boundary layer similarity measures which are the basis of contemporary EPA models used for both short range and long range transport applications. Helped enormously by advances in computer technologies, in the 1990s, significant advances were made in numerical weather prediction models and also further improve dispersion models through the incorporation of field experiment results and improved boundary layer parameterization. The decade starting with the year 2000 has seen improved resolution of meteorological models such as MM5 and the routine linkage of meteorological models with transport and dispersion models as exemplified by the real time forecasts of detailed fine grid weather conditions available to the public at Olympic events. Computational Fluid Dynamics (CFD) models which involve very fine grid numerical simulations of turbulence and fluid flow began to see applications in atmospheric dispersion studies. The next decade will see routine application of CFD techniques to complex flows associated with emergency response needs.

The nuclear industry does not show evidence of keeping up with these technological advances. For use in modeling air quality concentrations, the NRC uses straight-line Gaussian dispersion algorithms that date back to the 1960s. EPA should, but does not, advocate in the draft keeping up with these technological advances. Complex flow situations such as those associated with flow around high terrain features or that would incorporate sea breeze circulations are not

ED_001057_00026684

simulated. For emergency response applications, the EPA, unlike NRC, should be advocate of advanced modeling to be installed at nuclear power plants.

Atmospheric Scientists & Meteorologists

For over three decades atmospheric sci entists and meteorologists have been identifying problems in the use of models similar to ATMOS for such settings. Example: Steven R. Hanna, Gary A. Briggs, Rayford P. Hosker, Jr., National Oceanic and Atmospheric Administration, Atmospheric Turbulence an d Diffusion Laboratory, *Handbook on Atmospheric Diffusion* (1982)).

The inability of a simple Gaussian plume model to accurately predict air transport and dispersion in complex terrains is such a basic flaw that it is discussed in a textbook for a college - level introductory course in environmental science and engineering (Steven R. Hanna, Gary A. Briggs, Rayford P. Hosker, Jr., National Oceanic and Atmospheric Administration, Atmospheric Turbulence and Diffusion Laboratory, *Handbook on Atmospheric Diffusion* (1982)). (Chapter 13 authored by William J. Moroz). In listing the assumptions that are made to develop a simple straight line Gaussian plume model, the textbook warns that:

The equation is to be used over relatively flat, homogeneous terrain. It should not be used routinely in coastal or mountainous areas, in any area where building profiles are highly irregular, or where the plume travels over warm bare soil and then over colder snow or ice covered surfaces

B. Real-Time Offsite Radiation/Meteorological Air Monitoring Stations

The EPA Final PAG needs to emphasize in clear language the need for robust real -time monitoring data to help address the question of what was emitted, over what timeframe, where it went thereafter, and what did it do or not do to the surrounding public. The importance is threefold:

(1) Fore-casting (ahead of time, as a tool for emergency planning tool for pre-planning). Where would a plume likely go under various typical weather regimes, and what and where could be the resultant concentrations/potential doses?

ED_001057_00026684

(2) Now-casting (during a radiological emergency). Where is the plume actually going, and what are the resultant concentrations/potential doses - for making appropriate recommendations (i.e., evacuate or shelter in place)?

(3) Hind-casting (the post -radiological emergency timeframe) – Combining meteorological modeling with expanded meteorological/radiological data to provide for more accurate/realistic dose estimates can help with disaster recovery, clean -up, litigation resolution, and short -term acute and long-term epidemiological health studies.

Multiple Meteorological Towers Importance Recognized Since the 1970's

Since the 1970s, the USNRC has historically documented all the advanced modeling technique concepts and pote ntial need for multiple meteorological towers especially in coastal regions. NRC Regulatory Guide 123 (Safety Guide 23) On Site Meteorological Programs 1972, states that, "at some sites, due to complex flow patterns in non -uniform terrain, additional win d and temperature instrumentation and more comprehensive programs may be necessary]; and an EPA 2000 report, Meteorological Monitoring Guidance for Regulatory Model Applications, EPA-454/R-99-005, February 2000, Sec 3.4 points to the *need for multiple inla nd meteorological monitoring sites.* See also Raynor, G.S.P. Michael, and S. SethuRaman, 1979, Recommendations for Meteorological Measurement Programs and Atmospheric Diffusion Prediction Methods for Use at Coastal Nuclear Reactor Sites. NUREG/CR-0936.

C. Environmental Sampling/Monitoring

The Draft PAG recognizes that dose projections are useful for initiating protective actions in the early phase but there is uncertainty prior to confirmatory field measurements because of unknown factors affecting environmental pathways, inadequacies of modeling and uncertainty in the data for release terms. (Draft, pg., 22) However what is not acknowledged are the limits of field measurements due to lack of funds and sufficient staff to perform the field measurements in a timely manner. Also the PAG does not indicate specifics such as how deep in the soil samples should be taken nor how often the samples should be repeated in the same area to account for resuspension or aqueous discharges and runoff.

ED_001057_00026684

III. PLANNING GUIDANCE AND PAGS (DRAFT, PG., 7)

Decisions regarding protective actions depend on dose response guidance. Whether the dose-response guidance is based on the best science on radiation health effects available today will determine whether the protective actions are protective of human health. Unfortunately the Draft PAGS are based on old science and out-of-date meaning the public will be harmed unnecessarily not protected.

Pilgrim Watch incorporates herein the testimony in full presented by Dr. Daniel Hirsch, Committee to Bridge the Gap, California. Highl ights of what is wrong with the PAGS and how EPA is abdicating its responsibility to protect public health include, for example:

1. EPA eliminates the existing requirements from the 1992 PAGs triggering evacuation when thyroid or skin doses exceed specified limits.
2. EPA eliminates the existing relocation limit of 5 rem cumulative dose over 50 years, saying it might conflict with their long -term cleanup approach, which in the new associated guidance from NCRP would allow cumulative 50 -year doses of 100 rem, twenty-fold higher. Even thirty years exposure at the 2 rem/year figure would, by EPA's own official risk estimates, result in an excess cancer in every eighth person exposed ; orders of magnitude higher risk than EPA has ever considered acceptable.
3. EPA incorrectly argues that relaxed long-term standard is somehow justified because the public's exposure will not be for 70 years. But this is a disingenuous argument. The core of the long-term cleanup part of the PAGs is setting a very high permissible annual dose that one would be allowed to get for a whole lifetime (indeed, the standard 70 year lifetime assumption) without the government having to cleanup at all. The one-year exposure is for the intermediate phase; the long-term phase is forever, and that is what is so troubling about relaxing long-term cleanup standards.
4. EPA says that the Safe Drinking Water Act Maximum Contaminant Limits (MCLs) may not be appropriate and propose five alternatives far more lax , and does so in footnotes. Those proposed weaker l imits would allow concentrations of radionuclides in drinking water orders of magnitude higher than considered safe by EPA under the Safe Drinking Water Act. I have attached two tables Dr. Hirsch put together comparing these levels for four key radionucli des. Their proposals are frequently as bad as the Bush water PAG

ED_001057_00026684

proposal and in some cases worse. Generally, they are proposing allowing hundreds to tens of thousands of times higher concentrations of radioactivity in drinking water than EPA has historically allowed as safe under the Safe Drinking Water Act.

Obama Drinking Water PAG proposals vs. Existing EPA Safe Drinking Water Levels and Bush Administration PAG Proposal
units = Bq/L

Radionuclide	EPA Safe Drinking Water Act Maximum Contaminant Limit (MCL)	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	0.111	314	314	3000	170	10	300
Strontium-90	0.296	246	246	200	160	10	
Cesium-137	7.4	503	503	2000	1200	10	
Plutonium-239	0.555	27	27	50	2	1	

Factors by Which Obama Drinking Water PAG Proposals Would Exceed Existing EPA Safe Drinking Water Levels

Radionuclide	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	2829	2829	27027	1532	90	2703
Strontium-90	828	828	676	541	34	
Cesium-137	68	68	270	162	1.35	
Plutonium-239	49	49	90	3.6	1.8	

Note: Second vertical column, "Obama proposed Drinking Water Page" should read PAGs not Page

5. EPA incorporates 1998 guidance allowing extremely high contamination of food, despite internal EPA criticism of doing so which said it would produce a cancer in every fiftieth person so exposed.
6. EPA incorporates the DHS PAGs for dealing with long-term cleanup from a nuclear weapons explosion and applies it to any kind of release. The DHS PAG is based on "optimization" and contemplated permitting long-term doses as high as several rem per year. The new PAG is tied to the NCRP new guidance which would allows doses up to 2 rem per year over a lifetime (the equivalent of about 1000 extra chest X-rays every year, or 3 X-rays every day of your life from birth to death). EPA's estimate of a 70-year

ED_001057_00026684

lifetime exposure at that level would be one in every six people exposed would get a cancer (the risk coefficient they use is different for exposure over a lifetime than for earlier years because of the elevated risk at younger ages

7. The associated NCRP guidance on implementing the PAGs for long term cleanup recommends radionuclide concentration levels so high that they would allow concentrations for strontium-90, for example, hundreds of thousands of times higher than the EPA's official Preliminary Remediation Goals for the same exposure scenarios. They would produce cancer risks using EPA's risk figures in the several cancers per ten people exposed, orders of magnitude outside the long-held acceptable risk range.
8. In essence, the PAGs and the documents associated with them are saying nuclear power accidents could be so widespread and produce such immense radiation levels that the government would simply abandon most cleanup obligations and force people to live with exposures so high that extremely large fractions of the exposed population would get cancer from the exposure.
9. Troubling in a different fashion, EPA buries the "bad stuff" in footnote references to a whole series of other documents so it is hard for a lay reader to see the troubling things EPA has done. EPA thereby has made the PAG manual itself essentially useless in a real accident. It was supposed to be a stand-alone, clear document that a first-responder could take off the shelf, look up a table in it, see if a radiation level exceeded a PAG and if so undertake the protective action described therein. But all of that is now removed from the PAG document. Instead, there are footnotes to URLs for numerous referenced documents, most of which are contradictory, so that the PAG does not achieve its intention that is to be useful in providing some guidance.

Furthermore, EPA is statutorily mandated to produce the PAGs and other radiation guidance for the rest of the federal family and historically has viewed DOE and NRC as not sufficiently protective in radiation matters. The PAG now abdicates EPA's responsibility to come up with guidance and instead references almost exclusively documents from DOE that EPA has historically opposed. For example, it now directs the use of DOE's Operational Guidance document which uses cleanup concentrations hundreds of thousands of times higher than EPA's official concentrations. Rather than

ED_001057_00026684

use its own conversions from conce ntration to risk, EPA now defaults to DOE's models, documents, and values with which it has long disagreed as technically not defensible and not sufficiently protective. But at the end of the day, no emergency responder will have a Protective Action Guide that is useable. If it were used, however, it would allow doses to the public so far outside the range ever considered acceptable as to be deeply disturbing.

IV. EARLY PHASE PROTECTION ACTION GUIDANCE

The Draft PAG's guidance is insufficient or incorrect for: dose that triggers evacuation, discussed above; potassium iodide; omission of the importance of stockpiling 3-M face masks; and apparent confusion over the requirement for, and role of, Reception Centers.

Potassium Iodide, KI (Draft Section 2.3.4)

KI is FDA approved: It is stockpiled around the world and recommended by experts such as: the World Health Organization; the National Academies of Sciences [8] that acknowledged KI's efficacy and that it may be necessary beyond 10 -miles; American Thyroid Associati on; the International Atomic Energy Agency; President Carter's Kemeny Commission; Federation of American Physics; U.S. Public Interest Group. Although adverse reactions are possible, but rare, to those allergic to iodine; however, unlike exposures to radia tion, no long term negative effects or fatalities are on record.

Contrary to FDA and the above listed organizations, the EPA PAG improperly blows out of proportion KI's supposed contraindications, indicating a strong bias to discourage its use – politics over science. For example, EPA says that:

> Some people should not take KI . As a rule, individuals with known allergy to iodine or with pre-existing thyroid disease (e.g., Graves' disease, thyroid nodules, Hashimoto's thyroiditis) that might predispose th em to adverse reactions should avoid KI. (Draft, pg., 20)

FDA, in contrast, says that individuals with known allergy to iodine or with pre-existing thyroid disease should be treated with caution; EPA says that they "should avoid KI.

[8] *Distribution and Administration of Potassium Iodide in the Event of a Nuclear Incident, 2004*

ED_001057_00026684

KI-Time Sensitive: The Draft EPA Guidance avoided to make clear[9] that because KI is time sensitive, it must be stockpiled ahead of time and taken so that it can be administered at the earliest possible time. The Final PAG needs to correct this omission.

Distance to Stockpile K I: The Draft makes no recommendation or mention of the distance from reactors that KI should be stockpiled. The Bioterrorism Act's Section 127, for example, called for stockpiling KI out to 20 miles from a reactor site. It was never implemented for purely political reasons despite the fact that NRC stockpiles KI for its employees.

The reason to provide KI in the 10 -20 mile zone is because of the possibility of inhalation during an accident of significant consequence. For example, Dr. Temeck (FDA representa tive to NRC's KI Core Group Meeting, Tempe Arizona, March 4, 1999) stated that exposure to children after Chernobyl resulted from "a combination of inhalation and ingestion."

NRC's NUREG-1633 points out that radioactive iodide can travel hundreds of mil es on the winds. An increase in cancer caused by Chernobyl was detected in Belarus, Russia and Ukraine. Notably, this increase, seen in areas more than 150 miles from the site, continues to this day and primarily affects children who were 0-14 years old at the time of the accident…the vast majority of the thyroid cancers were diagnosed among those living more than 31 miles from the site. The 2001 figures showed 11,000 thyroid cancers at 31 miles. Again, "Exposure to children after Chernobyl resulted from "a combination of inhalation and ingestion."

NRC's NUREG/CR 1433 said that for children, the following dangers might occur from the inhalation of nuclear materials after a massive core-melt atmospheric accident (like Chernobyl):

Approximate Dangers of a Core-Melt Atmospheric Accident for Children

Distance in Miles	Mean Thyroid Dose (rem) for Exposed Children Outdoors*	Probability of Thyroid Damage to Exposed Children Located Outdoors if not Protected by Stable Iodine (like KI)
1	26,000	100%
5	11,600	100%

[9] See Draft PAG, for example, at pgs19-20, 33

ED_001057_00026684

10	6,400	100%
25	2,200	80%
50	760	26%
100	200	7%
150	72	2%
200	32	1%

Therefore EPA's Final PAG should advocate stockpiling KI to at least 20 miles, and that both the Federal Government [10] and states have KI stockpiles located so as to provi de KI in a timely manner to those without it.

Pilgrim Watch incorporates in full the comments on Potassium Iodide submitted on this docket by Peter Crane, Seattle Washington.

Face Masks

The PAG says that "breathing air filtered through common household it ems (e.g., folded handkerchiefs or towels) may help reduce exposures from contamination on the ground. (General Guidance for Evacuation and Sheltering in pace, pg., 17) Instead, PW recommends that the Final EPA PAG recommends stockpiling face masks in publ ic shelters, schools; and that emergency planners include face masks in their public education literature. The PAGs advice is not practical for school children and the rest of the public for that matter. Imagine a mother leaving a shelter with two small ch ildren to drive to the Reception Center for monitoring, decontamination and relocation instructions. How possibly can she drive and cover her and her children's mouths? Also, masks may be useful inside shelter locations, because shelters cannot be 100% eff ective in eliminating dose. The basic 3-M (N-95) type masks screen out >0.1 microns and are inexpensive. They come in child and adult sizes.

[10] The U.S. Strategic National Stockpile stopped purchasing KI (Washington Post, April 7, 2011)

ED_001057_00026684

Reception Centers- Monitoring & Decontamination

Section 2.31 says that "A decontamination Station, with simple d econtamination actions, may need to be collocated at shelters during the pre -evacuation period." The language is confusing for reactor accidents. Radiological emergency plans for nuclear reactors require Reception Centers located outside the EPZ. NUREG -0654, J-12 says that Reception Centers shall monitor 100% of the population within 12 hours. Therefore the Reception Centers must be equipped with sufficient monitors (portal and hand monitors), have capability to decontaminate as required, and provide towe ls and clothing or coveralls for the public to wear after decontamination. The Final PAG must make this clear.

Similarly, Radiological Emergency Workers Monitoring and Decontamination Stations must be located outside the EPZ and equipped to monitor and decontaminate.

Vehicles arriving at the Reception Centers or REWMDS also must be wiped down so as not to spread contamination to clean areas. The PAG is silent on REWMDS.

V. INTERMEDIATE PHASE (CHAPTER 3)

The Draft says that "The principal protective actions fo r reducing exposure of the public to deposited radioactive materials are relocation, decontamination and time limits of exposure."

A. Relocation

The Draft says that relocation should be based on 2 rem (2,000 millirem) over the first year of exposure and afte r the first year, the PAG relocation standard is 0.5 rem (500 millirem). (Draft, pgs., 7, 50)

The PAG **eliminates the existing relocation limit of 5 rem cumulative dose over 50 years, saying it might conflict with their long -term cleanup approach**, which in the new associated guidance from NCRP would allow cumulative 50-year doses of 100 rem, twenty-fold higher. Even thirty years exposure at the 2 rem/year figure would, by EPA's own official risk estimates, result in an excess cancer in every eighth person exposed; orders of magnitude higher risk than EPA has ever considered acceptable

ED_001057_00026684

B. Decontamination & Cleanup

The key points to reduce exposure of the public in both the intermediate and late phase are not properly addressed. They include, for example:

- Meteorological modeling with expanded meteorological/radiological data to provide for more accurate/realistic dose estimates that can help with disaster recovery, clean -up (discussed in the foregoing);
- Capability to decontaminate - hosing buildings and plowi ng under fields does not decontaminate but simply moves the contamination from one place to another;
- Waste disposal, admitted to be impossible in a severe reactor accident but shifting responsibility to the state and local community is not the answer, either; and
- Updated dose estimates based on BEIR VII and geared to the most vulnerable -women and small children.
- Avoided is a discussion of what federal agency is in charge and who pays.

DECONTAMINATION/CLEANUP- NOT PROPERLY ADDRESSED

The EPA Draft never ch allenges current NRC/FEMA assumptions reflected in NRC's consequences models that:

- Underestimates both the size of the area likely to be contaminated, and the extent of contamination.
- Underestimates how long cleanup and decontamination will take.
- Ignores that forests, wetlands, and bodies of water essentially cannot be cleaned up or decontaminated and in turn runoff will re-contaminate cleaned areas.
- Ignores that the technologies needed for cleanup have not even been developed.
- Underestimates the huge vol ume of waste; and slides over the fact that there are no available disposal options.
- Ignores there is not even a clear-cut cleanup standard -guidance not regulation.
- Assumptions are based on estimates of what is required for nuclear weapon cleanup, rather than the very different problems presented by nuclear reactor accident - micron size and volume.

ED_001057_00026684

- Minimizes consequences by assuming a straight -line Gaussian plume model, ignoring aqueous discharges, and ignoring that an accident can persist over many weeks and months.
- Underestimates the time that decontamination will take. Technologies to cleanup have not been developed; current cleanup methods used in Japan and assumed in US models do not work- hosing down buildings and plowing under fields. They are based on nuclear weapons cleanup that is a different from cleanup after a nuclear reactor accident. Many radionuclides, like Cs-137, have long half-lives.

The Contaminated Area

The cost of cleanup fundamentally reflects the size of the area contaminated, and the level of contamination. A year ago, the Japanese press reported that the Fukushima accident contaminated 13,000 square kilometers (an area nearly equivalent to the size of Connecticut (land area and water). The contaminated area extended in all directions and at considerable distance from the site. [11] The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) map showed the spread of radiation from Fukushima across 10 prefectures, including Tokyo and Kanagawa. [12] Also so far as Pilgrim Watch (hereinafter "PW") knows, no one has even attempted to calculate how much of the Pacific Ocean and connecting waters have been contaminated by aqueous discharges and those impacts on the size of the area contaminated, impact on cleanup and human health from consuming fish and seafood.

Beyond "how large an area," is the question of "how contaminated?" The level of contamination in the affected areas depends on both the size of the release at any point in time, and also on its duration. The Fukushima release has continued for months.

The basic lesson to be learned from these simple facts is that any remotely adequate consequence analysis must take into account the very real likelihood of a large level release that

[11] *Estimated 13,000 square km eligible for decontamination* Asahi.com (Asahi Shimbun), Oct 12, 2011
[12] Mainichi News, http://mdn.mainichi.jp/mdnnews/news/20111007p2a00m0na009000c.html; Gov't radiation info in English http://radioactivity.mext.go.jp/en/

ED_001057_00026684

continues for a long period of time and contaminates many thousands of square miles. The EPA Draft and current NRC economic analyses unrealistically limit the duration of the radioactive release, the size of the affected area, and the radiation source.

- Duration: The Fukushima disaster persisted over many months. But the EPA Draft and NRC approved consequence code, MACCS2, limits the total duration of a radioactive releases to no more than four (4) days, if the user chooses to use four plumes occurring sequentially over a four day period.[13] A longer release such as that at Fukushima will cause offsite consequences that will increase contamination, and result in required re-decontamination, and significantly increase cleanup costs and the overall cost-benefit analyses.
- Size of Affected Area. How large an area will be contaminated, and where that area is likely to be, depends on assumptions made about the radioactive plume. Fukushima showed that the plume did not travel simply in a straight-line.[14] Fukushima also showed that releases can extend for weeks and months and thereby the plumes will travel in variable directions. Rascal also assumes a Gaussian plume in the near field and a segmented Gaussian plume in the far field. This ignores that winds are complex and variable near large water bodies, along rivers, and hilly terrain so that a much larger geographic area, in multiple directions, is impacted. EPA needs to incorporate these lessons in the final PAG.
- Non-Atmospheric Releases. Fukushima also showed that contamination is also spread by aqueous discharges. In Japan enormous quantities of contaminated water flowed into the Pacific Ocean as result of "feed and bleed" and from runoff into groundwater, streams and other water bodies from contaminants deposited by atmospheric releases on land.
- What Can't Be Cleaned-up? Lessons learned from Fukushima show that forests, water and shorelines, for example, cannot realistically be cleaned up and decontaminated. For example the Japan Times reported in September 2011[15] that

> In August, the government acknowledged difficulties in removing soil and ground cover from the forests, due mostly to the volume of radioactive waste that would be generated by the effort.

---

[13] NUREG/CR-6613 Code Manual for MACCS2: Volume 1, User's Guide, 2-2
[14] Gov't radiation info in English http://radioactivity.mext.go.jp/en/
[15] Institute probing radioactive contamination of Fukushima forests, Japan Times,, Sep. 17, 2011

ED_001057_00026684

"Huge volumes of soil and other (contaminated) items would be involved because the forests occupy a huge area."

The government effectively shelved any approach to decontaminating forests when it said that removing both the contaminated soil and compost materials would strip the forests of important ecological functions, including water retention.

Real world experience also shows that bodies of water, such as the Pacific, cannot be cleaned up either. Further, ocean currents may re-circulate the contamination for years contaminating and re-contaminating beaches and marine life increasing costs from a continuous need to cleanup and pay for damaged to the environment[16].

Waste Volume and Disposal

Lessons learned from Fukushima show that the Japanese Environment Ministry expects the cleanup to generate at least 100 million cubic meters (130 million cubic yards) of soil, enough to fill 80 domed baseball stadiums. [17]. The Yomiuri Press reported that disposal sites refuse to accept 140,000 tons of tainted waste. [18] Because there is no available storage for the high volume of waste and no community willing to host the disposal site,[19] waste is piling up and run-off from it contaminates and re-contaminates groundwater and property. [20] The problem cannot be solved soon because the technology is not there and cesium-137 takes 30 years to decay one half-life.[21]

The Japanese Government's clean-up budget for the next two years is $14 billion; the NRC's estimate is nowhere near that.

The Draft PAG passes disposal to the states and local communities; and it assumes that cleanup can be quickly accomplished. After Chernobyl, authorities quit trying to clean-up after 4 years.

---

[16] Fukushima's radioactive sea contamination lingers, Andy Coghlan, New Scientist, Sept 30, 2011; Radioactive cesium may be brought back by Ocean in 20-30 years , Tokyo Times, 09.16.11
[17] Ibid
[18] *Daily Yomiuri* - Disposal sites refuse to accept 140,000 tons of tainted waste March 4, 2012
[19] Mainiichi Press, *Residents near Fukushima mountains face nuclear recontamination every rainfall, October 11. 2011*
[20] Ibid
[21] Ibid

ED_001057_00026684

There is no excuse for ignoring waste storage, and Fukushima proved (and continues to prove) that latter is a pipe -dream. Even optimistically assuming an available radi oactive waste repository, it seems unlikely that there would be a sufficient quantity of transport containers, and many communities will quite certainly object to the millions of tons of hazardous materials being transported through them.

The EPA Draft si mply passes the buck. It acknowledges that "incidents that create large volumes of waste from a wide -scale radiological incident would likely overwhelm existing radioactive waste disposal capacity in the U.S." (Draft, pg., 69) Therefore it concludes that, "Following a nuclear incident, the states bear primary responsibility to identify and provide waste management options, including disposal capacity." (Ibid) The Draft incorrectly implies that there can be a solution. It says "safely managing and disposing of radioactive waste will require pre-planning at all levels of government and careful coordination with stakeholders at all stages of the decision-making process." (Ibid) It is time for EPA to pull "their big -boy pants up" and admit there is no solution.

Technologies for Cleanup Not Developed - Current Methods Ineffective

Cleanup methods used in Japan, and assumed in the Draft PAG, do not work. Hosing down buildings and plowing under fields does not remove contamination. It simply moves it to another place, such as the groundwater, to reappear at a later date and require more monies to either start again or bare the cost. For example, plowing will move the radiation to below the root zone for crops or reduce root uptake and food doses to the consumer of such crops. Thus, it cannot be said that the decontamination strategies identified remove the radiation from the environment. Also the fact that cesium is soluble, which means that precipitation events or fire-hosing can actually facilitate cesium binding to structural surfaces or spread it into a community's infrastructure (*e.g.*, sidewalks, gutters, drains, sewer pipes) and ecosystem (*e.g.*, groundwater, streams, lakes, reservoirs).[22] The ability of cesium and other fission products to bind to surfaces is especially pronounced for porous or rough surfaces.[23]

---

[22] Chanin, D.; Murfin, W. (1996). *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, DE9601166, Sandia National Laboratories. Original 300-dpi OSTI version available at: http://chaninconsulting.com/downloads/sand96-0957.pdf (10.4 MB), OCR-readable courtesy S. Aftergood, FAS, E-12.

[23] Ibid, 5-8, E-1, E-3, E-4, E-8, E-11

ED_001057_00026684

A reasonable question is why the EPA, FEMA, NRC and Japanese authorities assume hosing and plowing under fields is cleanup. The likely, and unacceptable, answer is that the needed technologies for clean up have not been developed - their development is predicted to be decades down the road - and the that cost of actually removing all of the contamination too big to even think about - far more than the $14 billion budgeted through 2014 by the Japanese government. However, the fact that the cost of any real clean -up is unimaginable is no excuse for the EPA to relax standards and allow folks to stay or move back to their communities.

The Faulty Premise of the Clean-Up Model[24]

Cleanup assumptions are based on WASH-1400; and WASH -1400, that in turn, were based on clean up after a nuclear explosion. Cleanup after a nuclear bomb explosion is not comparable to clean up after a nuclear reactor accident and assuming so will underestimate the task.

Particle Size : N uclear weapon explosions result in larger -sized radionuclide particles; reactor accidents release small sized particles. Decontamination is far less effective, or even possible, for small particle sizes. Nuclear reactor releases range in size from a fracti on of a micron to a couple of microns; whereas nuclear bomb explosions fallout is much larger - particles that are ten to hundreds of microns. These small nuclear reactor releases get wedged into small cracks and crevices of buildings making clean up extrem ely difficult or impossible. Further reactors release Cs-137 that are no only small particles but soluble. Cesium particles are capable of ion exchange with sodium and potassium in materials such as concrete and migrate over time into the interior and cannot be washed off. Plutonium on the other hand is insoluble.

Mass Loading: Nuclear weapon explosions result in fallout involving large mass loading where there is a small amount of radioactive material in a large mass of dirt and demolished material. Only the bottom layer is in contact with the soil and the massive amount of debris could be shoveled, swept up with brooms or vacuums resulting in a relatively effective, quick and cheap cleanup that would not be the case with a nuclear reactors fine particulate . The Japanese are learning this the hard way, as those in Chernobyl before had discovered.

[24] Chanin, D.; Murfin, W. (1996). *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, DE9601166, Sandia National Laboratories. Original 300-dpi OSTI version; NYS000241, December 21, 2011, Pre-filed written testimony of Dr. Francois J. Lemay, NYS Contention 12-C,

ED_001057_00026684

Type Radiation Released : In addition, a weapon explosion results in non -penetrating radiation so that workers only require basic respiration and skin protection. This allows for cleaning up soon after the event. In contrast a reactor release involves gamma radiation and there is no gear to protect workers from gamma radiation. Therefore cleanup cannot be expedited, unless workers health shamefully and unethically i s ignored. Decontamination is less effective with the passage of time.

Clean-up Standard

How clean is clean? The cleanup standard will be determined by what seems possible - how much it will cost and what the public will accept - not, as it should, by public health considerations.

> In the United States, a range of one in a population of ten thousand to one in a population of one million excess cancer incidence outcomes is generally considered protective for both chemical and radioactive carcinogenic cont aminant exposures. The range is the regulatory standard generally used in the context of EPA superfund response actions…A similar range risk may not be practically achievable for major incidents that result in the contamination of very large areas. In maki ng decisions about cleanup goals and strategies for a particular event, decision makers must balance the desired level of exposure reduction with the extent of the measures that would be necessary to achieve it, in order to maximize overall human welfare.
>
> While it may take many years to achieve final cleanup levels, a timely return to normalcy, including re -occupancy and viable community, will require a more flexible, iterative and inclusive. (Draft, pg., 53)

Likewise, firm standards were not pre -set in Ja pan prior to the accident. Real world experience there shows that the public will not tolerate a relaxed standard, unless misled b government agencies. The public expects cleanup to reach pre -accident levels.[25] The same will be true here.

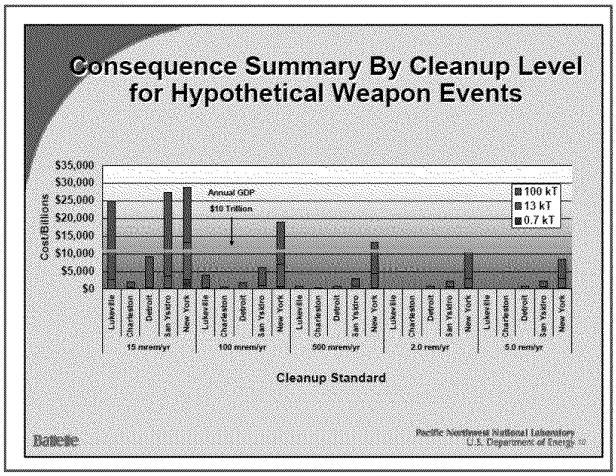
The economic cons equences of a radiological event are highly dependent on cleanup standards and cleanup costs generally increase dramatically for standards more stringent than 500 mrem/yr. This was shown true by two studies commissioned by the US Department of

[25] *In One Japanese City, Hot Spots to Avoid,* Wall Street Journal, Phred Dvorak, Sept 3, 2011

ED_001057_00026684

Homeland Security for the economic consequences of a Rad/Nuc attack. Although considerably more deposition would occur in reactor accident, magnifying consequences and costs, there are important lessons to be learned from these studies.

Barbara Reichmuth's study, Ec onomic Consequences of a Rad/Nuc attack: Cleanup Standards Significantly Affect Cost, 2005, [26] Table 1 Summary Unit Costs for D &D (Decontamination and Decommissioning) Building Replacement and Evacuation Costs provides estimates for different types of areas from farm or range land to high density urban areas. Reichmuth's study also points out that the economic consequences of a Rad/Nuc event are highly dependent on cleanup standards: "Cleanup costs generally increase dramatically for standards more stringent than 500 mrem/yr."



A similar study was done by Robert Luna, *Survey of Costs Arising from Potential Radionuclide Scattering Events,*[27] concluded that,

> …the expenditures needed to recover from a successful attack using an RDD type device …are likely to be significant from the standpoint of resources available to local or state governments Even a device that contaminates an area of a few hundred acres (a square kilometer) to a level that requires modest remediation is likely to

[26] Economic Consequences of a Rad/Nuc attack: Cleanup Standards Significa ntly Affect Cost Barbara Reichmuth, Steve Short, Tom Wood, Fred Rutz, Debbie Swartz, Pacific Northwest National laboratory, 2005

[27] Survey of Costs Arising From Potential Radionuclide Scattering Events, Robert Luna, Sandia National laboratories, WM2008 Conference, February 24-28, 2008, Phoenix AZ

ED_001057_00026684

produce costs ranging from $1 0M to $300M or more depending on the intensity of commercialization, population density, and details of land use in the area." (Luna, Pg., 6)

In essence, the PAGs and the documents associated with them are saying nuclear power accidents could be so widesp read and produce such immense radiation levels that the government would simply abandon most cleanup obligations and force people to live with exposures so high that extremely large fractions of the exposed population would get cancer from the exposure. He re, EPA's Draft PAG totally abdicates its responsibility to protect public health and the environment, not to mention morality.

C. Drinking Water Standard

The Drinking Water Standard is discussed above, Section II.

VII. LATE PHASE (CHAPTER 4)

There is overlap be tween the intermediate and late phase. In essence, the PAGs and the documents associated with them are saying nuclear power accidents , based on real -world experience in Japan, could be so widespread and produce such immense radiation levels that the government would simply abandon current exposure limits finding them not achievable and advise people to live with exposures so high that exposed population would get cancer from the exposure, especially the most vulnerable- fetus, children, women and the sickly.

The Draft PAG acknowledges that clean -up and decontamination is an enormously expensive job, extending over decades, and the volume and toxicity of wastes from a wide -scale radiological incident is likely to overwhelm existing waste capacity in the U.S. (pgs. 60, 61, 69). Therefore they pass responsibility for the impossible task of dealing with the waste to states; although, the federal government, not the states, have responsibility for assuring the safe operations of nuclear reactors and security. The federal agencies blew it and now the states get responsibility for the "orphaned" waste.

Further the EPA Draft PAG, like NRC, fails to acknowledge that the technology for real cleanup does not exist. As explained, hosing down buildings and plowing under f ields does not clean-up or decontaminate.

ED_001057_00026684

Last the section makes clear that the fundamental issues of clean up that: (1) neither the EPA, nor NRC , nor FEMA is responsible for clean-up; (2) that the cleanup standards that will determine what clean-up is required (and hence its cost) have not been defined; and (c) that no funding source has been identified. These three core points were identified in an Inside EPA investigative report in 2010- *Agencies Struggle to Craft Offsite Cleanup Plan for Nuclear Power Accidents*, by Douglas Guarino, Associate Editor. The report is available on line [28] or PW can make the report available, including emails obtained by Inside EPA by FOIA. The report says that:

> EPA, the Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) are struggling to determine which agency -- and with what money and legal authority -- would oversee cleanup in the event of a large-scale accident at a nuclear power plant that disperses radiation off the reactor site and into the surrounding area.

The FOIA documents indicate that the agencies began discussions in 2009 after NRC informed the other agencies that it does not plan to take the lead in overseeing such a cleanup; and significantly that money in the Price Anderson Act, an industry-funded insurance account for nuclear accidents, would likely not be available. See the documents obtained by *Inside EPA* (Part 1 and Part 2) under the Freedom of Information Act (FOIA, Part 1, July 27, 2010 Draft White Paper, developed by Jeff Blizzard (USEPA).

Until this is resolved – who is in charge, who pays, and what are the cleanup standards- the Final PAG should not be issued.

Who's In Charge – Who Is Responsible?

The Draft PAG Manual makes clear that no federal agency is in charge (section 4.1.6) - "federal departments and agencies may coordinate"(pg., 55); "Under the NRF and NDRF, FEMA may issue mission assignments to the involved federal agencies, as appropriate" (pg., 56) "NIMS was developed specifically for emergency management and may not be the most

[28] http://environmentalnewsstand.com/Environmental-NewsStand-General/Public-Content/agencies-struggle-to-craft-offsite-cleanup-plan-for-nuclear-power-accidents/menu-id-608.html

ED_001057_00026684

efficient response structure for long -term cleanup (pg., 57); "Issues that cannot be solved at the IC/UC or Unified Area Command level may be raised with the Joint Field Office (pg., 57); etc. "May" does not coordinate and take responsibility for getting the job done. Consequently without clear delegated authority, the job will drag on and not get done. The longer cleanup takes, probability is increased that resuspension will carry contaminants further afield and at the same time drive contaminants deep in the soil and groundwater.

History-Avoiding Federal Agency Responsibility

Disagreements over what government agency is in charge were documented in an investigative report by Inside EPA in 2010. It showed that:

EPA's Role: According to the Inside EPA investigative report, a July 27, 2010 white paper was never completed amid disagreements between EPA staff over what authority the agency may or may not have to clean up after a nuclear power plant accident. The paper cited Superfund as a possible source of cleanup funding – either through EPA's appropriation-driven Superfund trust fund or the agency's authority to sue parties responsible for contamination under Superfund law. But significantly EPA staff disagree on whether Superfund is applicable to clean up after a nuclear power plant accident, calling into question its viability as both a source of funding and cleanup authority.

Some at EPA contend that "special nuclear material from a nuclear incident" is exempt from the types of toxic releases governed by Superfund, according to the documents. Others suggest that such material is typically commingled with chemicals and other radioactive materials that are covered by the law, meaning EPA would be able to assert its Superfund authority to conduct a cleanup.

In internal e-mails, other EPA staff provides examples of instances where the agency has been involved with cleanups at nuclear power plant sites due to the sites being contaminated with chemicals. But Jean Schumann, a lawyer in EPA's Office of Emergency Management (OEM), criticized suggestions that the presence of chemical contaminants gives the agency the authority to clean up after a nuclear power plant incident. In one August 5 e-

ED_001057_00026684

mail, Schumann argues it is uncertain whether Superfund law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. "I think there is enough uncertainty still on what the 'release' exclusion means."

NRC's role: Some federal officials previously assumed NRC had authority and would be the lead agency. However, according to the FOIA documents attached, NRC said that it was not the lead agency and tried to "pass the ball" to EPA, suggesting EPA

would be the appropriate agency to lead such an effort. But, as said above, in an August 5, 2010 email, EPA's Ms. Schumann said that it was uncertain whether Superfund Law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. In the draft white paper

FEMA's Role: While NRC and FEMA require nuclear plants to have emergency response plans, it is not clear these plans extend beyond the initial aftermath of an accident or apply to radiation dispersed over large areas, the documents say. The government's emergency response authorities under the Stafford Act, for instance, expire 60 days after an incident, the draft document notes.

U.S. President: A Presidential declaration of an emergency "leads to rather limited financial assistance being made available through FEMA" and a "potentially more useful Presidential declaration of a major disaster" appears limited to "natural events," the document said.

States Responsibility: It is apparent that because, "waste resulting from a large scale incident would likely overwhelm current disposal capacity" (pg., 60), "[f]ollowing a nuclear accident, the states bear primary responsibility to identify and provide waste management options, including disposal capacity." (pg., 69)

Stakeholder Involvement: The section talks about opportunities for stakeholder involvement (pgs., 51, 52, 54-56) but it is our understanding that EPA is the only Federal Agency that requires stakeholder involvement. Therefore if EPA has a "say" in this regard,

ED_001057_00026684

cleanup will take longer; if, on the other hand, EPA remains not the responsible lead party, then meaningful involvement is not guaranteed.

Who Pays Or Where Is The Money Coming From?

Price Anderson: the industry-funded account established under the Price Anderson Act, which Congress passed in 1957 in an effort to limit the industry's liability, would likely not be available to pay for such a cleanup. The account likely could only be used to provide compensation for damages incurred as the result of an accident, such as hotel stays, lost wages and property replacement costs, the documents show, leaving federal officials unsure where the money to pay for a cleanup would come from.

Evidence – Emails Obtained by Inside EPA's FOIA Request

The following excerpt from Stuart Walker' email, EPA, says that "The insurance funds are not used to cover cleanup costs associated with the incident."

Evidence – Emails Obtained by Inside EPA's FOIA Request

The following excerpt from Stuart Walker' email, EPA, says that "The insurance funds are not used to cover cleanup costs associated with the incident."

From:	Stuart Walker/DC/USEPA/US
To:	Charles Openchowski/DC/USEPA/US@EPA
Date:	07/30/2010 06:54 PM
Subject:	Upcoming political level (AA, Administrator, maybe Obama/Biden) exercises emergency and late phase cleanup exercises on Nuclear Power Plant Incident

ED_001057_00026684

Dr. Steve Landry, SOE Support Team, reviewed the draft scenario. Dr. Landry explained that the intent of the scenario is to have significant damage that exceeds the cap of the $10 billion Price-Anderson Act (PAA). Additionally, the location chosen for the scenario event should be neither "worst case" nor "best case," but somewhere in the middle.

An NRC representative stated that the PAA actually has a $12 billion cap, but that it is not really the issue. The PAA is an insurance policy for displaced persons/damage in the event of a nuclear power plant incident. Once the $12 billion has been exceeded, the U.S. Treasury will cover costs for displaced people. However, the Insurance funds are not used to cover cleanup costs associated with the incident. The NRC representative also noted that each licensee is insured for over $300 million. Whether or not D/As could recover the costs allocated towards the cleanup is an open question and would be decided by the courts, but PAA is designed to support the people affected by the accident.

The following except from the July 27, 2010 Draft White paper says that, " NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after the nuclear power plant inci dent only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personal items, lost wages etc.

ED_001057_00026684

NRC-FEMA-EPA White Paper:
Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Incident

Background:

- The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Federal Emergency Management Agency (FEMA) began a series of quarterly meetings in 2009 to discuss unresolved concerns regarding off-site environmental cleanup following a nuclear power plant incident.

  Deleted: an

- NRC recently indicated to FEMA that they would not be taking the lead for off-site environmental cleanup after a nuclear power plant incident. NRC suggested EPA would be the appropriate agency to lead such efforts.

  Formatted: Bullets and Numbering

- NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident, only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personnel items, lost wages, etc).

  Deleted: the

- FEMA convened a workgroup to discuss the following issues related to nuclear power plant incidents: potential Agency roles (e.g., who would lead cleanup efforts); cleanup authorities; and fund sources.

- Evaluation of language from the *Price-Anderson Act*, the *Stafford Act*, and EPA's previous policies and expectation that the *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act) would generally not be used for response actions to address releases from NRC-licensed sites including nuclear power plants, may indicate a potential gap in authority to perform or oversee and fund off-site cleanup following a nuclear power plant incident, depending on the circumstances of the incident and the subsequent declarations of the federal government.

  Deleted: *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act), and

- The Report to Congress from the Presidential Commission on Catastrophic Nuclear Accidents (See Attachment D)[1]: outlines a number of concerns regarding nuclear power plant incidents. The report covers the sourcing of funds under a "Major Disaster," a "Catastrophe," and how to prepare and respond to a "catastrophic disaster."
  - Current plans do not cover "long-duration accidents that have impacts over large land areas".
  - The authority of the Court to award damages does not extend to executive branch powers.

Objective:

- Provide current understanding on potential authorities and sources of funding for off-site cleanup following a nuclear power plant incident.

The next except from the July 27, 2010 Draft White paper lays out the potential cleanup authority and funding source of the Price Anderson Act. It essentially repeats what Stuart Walker, EPA, email's said in the first example, "ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner."

ED_001057_00026684

Potential Cleanup Authority and/or Funding Source # 1: *Price-Anderson Act*

- Examples of Potential Circumstances Where It May Be Appropriate to Use the *Price-Anderson Act*: In addition to an accident, the nuclear power plant incident may be the result of: theft or sabotage; the transportation of nuclear fuel to a reactor site; or the storage of nuclear fuel at a reactor site.

- Possible Actions under the *Price-Anderson Act*:
  - Provide financial assistance to utilities operating nuclear power plants that have experienced an incident.
  - For individuals who have suffered damages:
    - Those who suffered bodily harm, sickness, or disease will receive financial assistance.
    - Evacuees receive property damage and loss expenses as well as living expenses.
  - Local and State governments can receive financial assistance to assist with evacuations, sheltering, and other immediate response activities.

- Funding Source for the *Price-Anderson Act*:[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act*:
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

Obtained by InsideEPA.com

Findings:

Potential Authorities and/or Funding Sources for Off-Site Cleanup Following a Nuclear Power Plant Incident

- *Price-Anderson Act:*
  - ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner.

Further, the following except from the July 27, 2010 Draft White paper from Kathryn Snead, EPA, explains again that there is a gap in authority to perform or oversee and fund offsite cleanup and that, at bullet 3, "NRC al so indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident only for compensation for

damages incurred (e.g., hotel stays, replacement costs for property and personal items, lost wages, etc.

Kathryn Snead To all, Please find attached a draft white paper o... 07/27/2010 03:51:39 PM

From: Kathryn Snead/DC/USEPA/US
To: Stuart Walker/DC/USEPA/US@EPA, Charles Openchowski/DC/USEPA/US@EPA, Jennifer Mosser/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA
Cc: Lee Veal/DC/USEPA/US@EPA, Jeffrey Blizzard/DC/USEPA/US@EPA
Date: 07/27/2010 03:51 PM
Subject: White Paper on Off-Site Cleanup Following a Nuclear Power Plant Incident

NRC-FEMA-EPA White Paper:
Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Incident

Background:

- The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Federal Emergency Management Agency (FEMA) began a series of quarterly meetings in 2009 to discuss unresolved concerns regarding off-site environmental cleanup following a nuclear power plant incident.

  Deleted: an

- NRC recently indicated to FEMA that they would not be taking the lead for off-site environmental cleanup after a nuclear power plant incident. NRC suggested EPA would be the appropriate agency to lead such efforts.

  Formatted: Bullets and Numbering

- NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident, only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personnel items, lost wages, etc).

  Deleted: the

- FEMA convened a workgroup to discuss the following issues related to nuclear power plant incidents: potential Agency roles (e.g., who would lead cleanup efforts); cleanup authorities; and fund sources.
- Evaluation of language from the *Price-Anderson Act*, the *Stafford Act*, and EPA's previous policies and expectation that the *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act) would generally not be used for response actions to address releases from NRC-licensed sites including nuclear power plants, may indicate a potential gap in authority to perform or oversee and fund off-site cleanup following a nuclear power plant incident, depending on the circumstances of the incident and the subsequent declarations of the federal government.

  Deleted: *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act), and

- The Report to Congress from the Presidential Commission on Catastrophic Nuclear Accidents (See Attachment D)[1]: outlines a number of concerns regarding nuclear power plant incidents. The report covers the sourcing of funds under a "Major Disaster," a "Catastrophe," and how to prepare and respond to a "catastrophic disaster."
  - Current plans do not cover "long-duration accidents that have impacts over large land areas".
  - The authority of the Court to award damages does not extend to executive branch powers.
- The following are questions and concerns are unresolved:

InsideEPA.com

DRAFT: DO NOT CITE OR QUOTE *July 27, 2010*

Potential Cleanup Authority and/or Funding Source # 1: *Price-Anderson Act*

- Examples of Potential Circumstances Where It May Be Appropriate to Use the *Price-Anderson Act*: In addition to an accident, the nuclear power plant incident may be the result of: theft or sabotage; the transportation of nuclear fuel to a reactor site; or the storage of nuclear fuel at a reactor site.

- Possible Actions under the *Price-Anderson Act:*
  - Provide financial assistance to utilities operating nuclear power plants that have experienced an incident.
  - For individuals who have suffered damages:
    - Those who suffered bodily harm, sickness, or disease will receive financial assistance.
    - Evacuees receive property damage and loss expenses as well as living expenses.
  - Local and State governments can receive financial assistance to assist with evacuations, sheltering, and other immediate response activities.

- Funding Source for the *Price-Anderson Act:*[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act:*
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

Obtained by InsideEPA.com

The following drafts from NRC-FEMA-EPA White paper: Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Accident, July 27, 2010, Pg., 3 repeat the same language.

- Funding Source for the *Price-Anderson Act:*[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act:*
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

At 6,

Findings:

Potential Authorities and/or Funding Sources for Off-Site Cleanup Following a Nuclear Power Plant Incident

- *Price-Anderson Act:*
  - ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner.

At 17

ED_001057_00026684

---- Forwarded by Elizabeth Southerland/DC/USEPA/US on 06/11/2010 12:13 PM ----

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

InsideEPA.com

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff anticipates this would be handled by some type of supplemental appropriation.

3. There is a FEMA expectation that EPA would be heavily involved in the environmental response work, possibly as the lead technical agency (think OSC, RPM role). EPA has not previously been major players in NRC exercises for NPP releases.

Charles and I believe we need a senior level management meeting (OSRTI, OEM, ORIA, OGC, and OHS) to discuss:

1. What would be proper role for EPA in these types of events, including the role of each of our primary offices and respective regional counterparts.
   -- There are of resource (FTEs and $'s) implications for EPA's level of involvement both during a real event and during exercises.
   -- There are also policy implications if EPA appears to be endorsing other cleanup approaches even in a remedial contractor role for NPP events, similar to concerns raised regarding the PAGs.

2. Given the current circumstances dealing with the Gulf spill (e.g., questions about who is in charge, is the federal government in control, etc) not inhibiting our flexibility under CERCLA is a key issue. Although possibly not the first choice to take a response action during a NPP incident, EPA should not agree to language that appears to a legal interpretation that inhibits this option.

---- Forwarded by Elizabeth Southerland/DC/USEPA/US on 06/11/2010 12:13 PM ----

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

InsideEPA.com

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff anticipates this would be handled by some type of supplemental appropriation.

3. There is a FEMA expectation that EPA would be heavily involved in the environmental response work, possibly as the lead technical agency (think OSC, RPM role). EPA has not previously been major players in NRC exercises for NPP releases.

Charles and I believe we need a senior level management meeting (OSRTI, OEM, ORIA, OGC, and OHS) to discuss:

1. What would be proper role for EPA in these types of events, including the role of each of our primary offices and respective regional counterparts.
   -- There are of resource (FTEs and $'s) implications for EPA's level of involvement both during a real event and during exercises.
   -- There are also policy implications if EPA appears to be endorsing other cleanup approaches even in a remedial contractor role for NPP events, similar to concerns raised regarding the PAGs.

2. Given the current circumstances dealing with the Gulf spill (e.g., questions about who is in charge, is the federal government in control, etc) not inhibiting our flexibility under CERCLA is a key issue. Although possibly not the first choice to take a response action during a NPP incident, EPA should not agree to language that appears to a legal interpretation that inhibits this option.

At 33,

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff

anticipates this would be handled by some type of supplemental appropriation.

At 36,

From: Kathryn Snead/DC/USEPA/US
To: "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, "Blunt, Kenyetta" <kenyetta.blunt@dhs.gov>, Sara DeCair/DC/USEPA/US@EPA, "DeFelice, Anthony" <anthony.defelice@dhs.gov>, diane.donley@dhs.gov, "Greten, Timothy" <Timothy.Greten@dhs.gov>, grace.kim@nrc.gov, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Jennifer Mosser/DC/USEPA/US@EPA, Charles Openchowski/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA, anneliese.simmons@nrc.gov, Susan Stahle/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Jeffrey Blizzard/DC/USEPA/US@EPA
Cc: Lee Veal/DC/USEPA/US@EPA
Date: 05/25/2010 09:57 AM
Subject: EPA-NRC-FEMA Recovery Discussion on Nuclear Power Plant Incidents

To all,

I apologize about the short notice - my fault for taking so long to send this out:

Our next inter-agency discussion on Recovery from Nuclear Power Plant Incidents:
June 3, 2010 from 1 PM - 3 PM
Follows the FRPCC Meeting (with a break for lunch 11:30 AM - 1 PM)
Crystal City Courtyard Marriott
Blue Ridge Shenandoah Conference Room
2899 Jefferson Davis Highway
Arlington, VA 22202

A few action items that were identified during the last meeting:
- Anneliese Simmons, NRC, agreed to provide example text on the insurance exclusion language on cleanup.
- Anneliese Simmons, NRC, agreed to check on what was meant by "clearly identifiable accidents".

At 45

From: "Greten, Timothy" <Timothy.Greten@dhs.gov>
To: Stuart Walker/DC/USEPA/US@EPA, Kathryn Snead/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, <grace.kim@nrc.gov>, "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, Jean Schumann/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Sara DeCair/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, "Greten, Timothy" <Timothy.Greten@dhs.gov>
Date: 11/30/2009 07:16 PM
Subject: RE: Agenda: EPA-NRC-FEMA Recovery Discussion

Potential Issue - FEMA looking for someone (e.g., EPA, Corps) to run cleanup of public property after nuclear power plant accident

Stuart Walker to: Elizabeth Southerland, Helen Dawson 12/08/2009 02:17 PM
Cc: RobinM Anderson

Betsy, this is a follow-up email about what I mentioned to you in the hall. Last week I, OEM, ORIA, and OGC staff (including Charles) met with FEMA and NRC policy and general counsel staff.

We were meeting to discuss the role of NRC, EPA, and FEMA after a catastrophic release from a nuclear power plant, and how the compensation clauses of the Price Anderson Act might come into play because of the CERCLA definition of "release" (which makes a reference to Price-Anderson in excluding some releases from CERCLA jurisdiction). In Price-Anderson, Congress in essence set up a federally-backed insurance scheme to compensate victims of a nuclear reactor accident (e.g., Three Mile Island).

I had thought that EPA was there to explain why previous policy from the removal program was incorrect in stating EPA could not respond to such releases under CERCLA authority, but rather EPA had authority but generally expected NRC to have authority over such incidents and did not expect to be involved except for possible help requested by NRC and/or state.

I was surprised to find out that NRC did not intend to be involved in the cleanup or Price-Anderson compensation decisions for contamination that was outside the fenceline of the facility. NRC said that the authority for spending the $10 billion insurance dollars that could become available when the Price Anderson Act is triggered would be lie with an Insurance Company. After those funds were gone, they thought EPA might handle the site cleanup.

NRC does not currently know if the $10 billion can only be used for compensation for damages suffered by members of the public, or if it can be used for site cleanup. Also they have not asked the insurance company if they have any plans/guidance on how they will decide to distribute the monies, whether they have contractors lined up to do the cleanup work or would they expect each affected property owner to do the cleanup after getting a claim paid, or how they will answer the question of "how clean is clean" for purposes of either cleanup or determining what is considered contaminated for the purposes of compensation.

We will be meeting together again as a group. NRC intends on finding out answers to the groups question either prior to that meeting or possibly inviting the insurance company to the next meeting.

fyi, attached is the agenda for the meeting. Below is an email from FEMA the night before the meeting that lays out some of the issues.

ED_001057_00026684

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "supertund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

The above (12/08/09) paragraph 5 -6 says that, "NRC does not currently know if the $10 billion can only be used for compensation for damages suffered by member of the public, or if it can be used for site cleanup. Also they have not asked the insurance company…how they will answer the question of 'How clean is clean' for purposes of either cleanup or determining what is considered contaminated for the purposes of compensation." By the time they wrote the July 27, 2010 Draft, they were clear that ANI only would pay for damages not cleanup, as the preceding emails show.

At 45,

From: "Greten, Timothy" <Timothy.Greten@dhs.gov>
To: Stuart Walker/DC/USEPA/US@EPA, Kathryn Snead/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, <grace.kim@nrc.gov>, "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, Jean Schumann/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Sara DeCair/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, "Greten, Timothy" <Timothy.Greten@dhs.gov>
Date: 11/30/2009 07:16 PM
Subject: RE: Agenda: EPA-NRC-FEMA Recovery Discussion

Good evening!

I hope everyone had a good Thanksgiving and made it through Monday.

After reading through the agenda and other notes, I ask that we move the discussion of the Stafford Act to after both Price Anderson and CERCLA have been discussed. Both of the other funding mechanisms should be discussed before we get to the Stafford Act, as both are the appropriate funding avenues before a Stafford Act declaration is made.

That said, I also have a suggestion about what our outcome might be, based on my discussing w/Diane Donnelly today. Please also excuse me if I'm missing key nuances or information here--I might be the newest player in this game.

I'm not sure how much cleaning up after a respectably-size nuclear power plant incident would cost. $50bil? The mechanisms set up by Price Anderson have set up a $10bil pool to pay for certain expenses. After that is exhausted, and for those expenses not covered, what vehicles are available? This is covered under Superfund language...yet my understanding is Superfund is essentially broke, as industry hasn't paid in since the mid 1990s. Likewise, Stafford Act funds are not available until a declaration is issued--and then only in line with what the declaration covers.

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "superfund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

Obtained by JeEPA.com

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "superfund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

January 7, 2011

Re: Fw: Price Anderson info

Stuart Walker to: Jeff Maurer 08/11/2010 05:44 PM

Cc: Gilberto Irizarry, Kathy Jones, Lois Gartner, Randy Deitz

We haven't ever spelled this out anywhere. Nor has final cleanup levels been discussed by the FEMA, NRC, EPA workgroup looking at Price Anderson Act issues. So I don't have a clear answer, but here are some of my thoughts.

EPA has said that under CERCLA, and some other environmental laws (e.g., SDWA, CAA, AEA) that 25/100 mrem is not protective. So I don't think we would want to say we would promoting that as a cleanup level. Also, at one point during the DHS PAG (guidance for dirty bombs and nuclear weapons) development process NRC said they wanted a final cleanup level of 1 to 10 rem (that is 1,000 mrem to 10,000 mrem) and they wanted to apply those cleanup numbers to nuclear power plant meltdowns. I am not sure if NRC still feels the same way now.

In some of the AA level (OAR, OSWER, OW, OGC) which were followed up by Gina MCcarthy of OAR meeting with Lisa Jackson, it was decided we would NOT be using optimization in the ORIA PAG (Protective Action Guidelines) that would be proposed for final cleanup. We would instead be talking about using existing standards. Since this language still has too be drafted it is not certain if/how specifically CERCLA will be mentioned.

Obtained by OnSideEPA.com

Thank you for the opportunity to make comment. We sincerely hope our comment is instructive and that the final PAG will be changed to reflect our comments.

Respectfully,

Mary Lampert
Pilgrim Watch, director
148 Washington Street
Duxbury, MA 02332
Tel 781.934.0389
Email: mary.lampert@comcast.net

ED_001057_00026684

Peter Crane / 6545 27th Ave. NW / Seattle WA 98117 / kinderhook46@yahoo.com */ 206-819-2661 (cell)*

July 4, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Ave., NW
Washington, DC 20460

Attn: Docket ID No. EPA-HQ-OAR-2007-0268

To the Docket:

Introduction and Summary

I appreciate the opportunity to comment on EPA's draft PAG Manual, "Protective Action Guides And Planning Guidance For Radiological Incidents." I will limit myself to the portions of the document that relate to potassium iodide (KI).

The EPA draft has serious defects, both of omission and commission, that require correction. Regrettably, it conforms to a pattern all too familiar to those who have followed the KI issue over the past 30 years, when agencies with no special expertise in drug safety venture into this area.

On the subject of KI, EPA should simply have deferred to the Food and Drug Administration. It has expert knowledge both about drugs in general and KI in particular, having declared it "safe and effective" for use in radiological emergencies as long ago as 1978. Instead, EPA 's draft includes warnings about contraindications for using KI that conflict significantly with FDA's.

Moreover, the EPA PAGs fail to mention two of the most significant studies of the safety and effectiveness of KI: the National Academies of Science report, commissioned by Act of Congress and published in 2004, and the paper, co-authored by Drs. Janusz Nauman and Jan Wolff, that described the Polish experience in administering KI after Chernobyl. These striking omissions demand correction.

ED_001057_00026684

Discussion

Potassium iodide is to my knowledge the sole aspect of American life in recent years in which the Government has made a conscious decision to weaken rather than strengthen public protection against terrorism. As the *Washington Post* reported on April 7, 2011:

> The U.S. Strategic National Stockpile stopped purchasing the best-known agent to counter radioactive iodine-induced thyroid cancer in young people, potassium iodide, about two years ago and designated the limited remaining quantities "excess," according to information provided by the U.S. Centers for Disease Control and Prevention to ProPublica. Despite this, the CDC Web site still lists potassium iodide as one of only four drugs in the stockpile specifically for use in radiation emergencies.

Why was KI removed from the Strategic National Stockpile? Apparently, the committee that maintains the stockpile felt that it had no choice, in view of the 2008 decision of the late John Marburger III, Science Advisor to President Bush, refusing to implement the 2002 law that provided for distribution of KI beyond the 10-mile radius around nuclear plants in which the Nuclear Regulatory Commission (NRC) was offering it to states.[1]

Marburger's decision, which relied on technical support from the NRC staff, failed to heed the advice of a definitive National Academies of Sciences study, commissioned by Congress and published in 2004, which had concluded that in an accident, KI might in some cases be needed beyond the 10-mile radius. Produced by a committee consisting of 13 distinguished experts from the United States and abroad, and published in book form in 2004 as *Distribution and Administration of Potassium Iodide in the Event of a Nuclear Incident*, its 248 pages constitute the definitive Government-sponsored study of the drug. (President Obama's Science Advisor, John Holdren, has so far refused to disturb his predecessor's ill-advised decision, despite pleas for reconsideration from the

[1] In the interest of full disclosure, I should mention that the rule change under which NRC agreed in 2001 to provide KI to states for populations within the 10-mile radius was in response to a petition for rulemaking filed by me in 1995. The grant of that petition was a decision of the NRC Commissioners, made over the bitter opposition of the NRC technical staff.

ED_001057_00026684

American Thyroid Association, Congressman Ed Markey, and others.)[2]

The question that readers new to this subject may be asking is this: what is the basis for the opposition to KI? What is so wrong with having it available in emergencies?

Perhaps the clearest and most forthright answer came from the NRC's senior adviser for preparedness, quoted in an October 22, 2007 article in USA Today ("White House may stop plan for anti-radiation pills") as saying that the NRC "opposes broad distribution of the pills because the best way to eliminate risk is to make sure people don't eat contaminated food." The article continued:

> She also says the NRC is concerned about undermining the reputation of the nuclear industry. "It's always a concern that if you expand the distribution (of the pills), you don't have confidence in the plants," she says. "We have studies that show the safety of our plants."

Thus the need to send a message of confidence in the safety of nuclear power plants trumps preparedness for possible acts of radiological terrorism.[3] We just have to hope

---

[2]If readers consulted the NAS report, they would recognize the factual problem with one statement on page 22 of the EPA document: "**Although the size of the EPZ is based on the maximum distance at which a PAG might be exceeded**, the actual boundary of an EPZ should be demarcated by features readily identifiable by people within that area." [Emphasis added.] This strongly implies that the 10-mile EPZ provided by NRC regulations is adequate to ensure that PAGs will not be exceeded. However, the NAS report was clear in saying that under some accident conditions, KI would be needed beyond the boundaries of the EPZ – a finding that the NRC staff refused to acknowledge. See the March 27, 2006, letter to NRC from HHS Secretary Michael Leavitt, sharply criticizing the NRC for mischaracterizing the findings of the NAS report in a letter to HHS, in which it had used selective quotation to create the inaccurate impression that the NAS saw no need for KI beyond the 10-mile EPZ. (See joint letter of September 26, 2007, from Professor Frank von Hippel and Peter Crane to Senator Joseph Lieberman, accessible here: http://pbadupws.nrc.gov/docs/ML0728/ML072831363.pdf) For his earnest desire to ensure better radiation protection for American children, his major concern, Secretary Leavitt was stripped of authority over KI in July 2007. That authority was transferred to the President 's Science Advisor and NRC, with the entirely foreseeable result that the statute was effectively nullified a few months later.

[3]There are easy answers to these arguments. First, KI is a supplement to other measures, not a substitute for them. We are better off having more arrows in our q uiver in an emergency than fewer. As to the notion that having KI would suggest that nuclear plants are unsafe, the same rationale would support removing life jackets and lifeboats from ferry boats, lest the public see them as implying that the boats are unsafe. The NRC position, incidentally, corresponds exactly to that expressed by NUMARC, a nuclear trade association (forerunner of today's Nuclear Energy Institute), which declared in a 1993 White Paper

ED_001057_00026684

that the day never comes that KI is needed, and the nation learns that the drugs that once were in the Strategic National Stockpile were disposed of as "excess."

In an op-ed published in the *New York Times* on March 23, 2011, as the Fukushima accident was unfolding, Professor Frank von Hippel of Princeton University commented that the Nuclear Regulatory Commission had "fought relentlessly" against the stockpiling of KI. This was by no means an exaggeration. As though to prove his point, an NRC staffer was quoted in an Associated Press article of March 31, 2011, as saying that the agency was "absolutely confident" that a 10-mile radius for KI distribution was sufficient. Whether right or wrong, it was plainly premature, with the accident still in progress, for NRC to reach any such conclusion.

All too often, the NRC has used interagency consultative processes to press its deeply held policy views on other agencies, sometimes to their later regret.[4] I wish to stress in the strongest terms, however, that I have no knowledge that this occurred here.

Invariably, in the various defective Government issuances on KI, we see a suppression of pertinent and valuable information on the one hand, coupled with the introduction of erroneous and misleading information on the other. This EPA document is no exception. The most egregious omission is the absence of any discussion or citation of the National Academies of Science report on KI referred to earlier. This is as incomprehensible as if a Government agency published a document on the causes and effects of nuclear accidents without mentioning the Kemeny Commission report on Three Mile Island, or on the risks of space flight without mentioning the Rogers Commission report on the Challenger disaster.

To take another example, the best empirical data on the safety of KI when used on a

---

that if KI were stockpiled, "public confidence in the technology could be affected."

[4] For example, in 2004, HHS issued draft KI guidelines, pursuant to the 2002 statute. It discovered only afterwards that what it had published was a recycled version of an NRC staff paper from 1997, SECY-97-124, which the NRC Commissioners had rejected at that time, for good reason. In the HHS notice, as in the NRC staff paper, there was no mention of Chernobyl or of the FDA "safe and effective" finding, and the reader had to get many pages into the notice to find out that the purpose of KI was to prevent cancer. A rueful HHS withdrew the guidelines and started again from scratch.

ED_001057_00026684

mass scale is the Chernobyl accident, in which Polish authorities, under the direction of Dr. Janusz Nauman, gave out 18 million doses of the drug, 10 million of them to children, within a short time. The total number of persons with adverse reactions requiring hospitalization, and that only briefly, was two. Both were adult males who took the drug despite knowing that they were allergic to iodine.[5]

Dr. Nauman co-authored a paper on the Polish KI experience with Dr. Jan Wolff, an American scientist at the National Institutes of Health: Nauman J, Wolff J. "Iodide Prophylaxis in Poland After the Chernobyl Reactor Accident: Benefits and Risks." *Am J Med* 1993; 94: 524-532. It is a seminal, basic work in the field, and is cited in the FDA guidance on KI and innumerable other studies in this area. I cannot think of a single journal article or government study on KI in nuclear emergencies that does not refer to it – with the sole exception of these draft PAGs, which neither mention nor cite it.

Why the omission? Surely it is important for readers of the PAGs to know that the risks of KI administration on a mass scale, while not negligible, are extremely small.[6] As I was preparing these comments, I telephoned the EPA contact on the PAGs paper to

---

[5]Dr. Nauman once told me, "We asked them why they had taken it, after they had been warned not to, and they said, 'We thought it was a matter of life and death.'"

[6]It is worth noting that in the 1990's, the NRC technical staff was deeply displeased by the Nauman-Wolff paper, since it undercut the staff's argument that the risks of KI administration were unacceptably high for the drug to be stockpiled. In a 1998 technical assessment of KI (Draft NUREG -1633, "Assessment of the Use of Potassium iodide (KI) As a Public Protective Action During Severe Reactor Accidents), the NRC staff even made a disparaging reference to the Nauman-Wolff article, saying of it, "to the extent we believe the report...." I drew attention to this slur in a paper I gave at Cambridge University in the summer of 1998, "Potassium Iodide Prophylaxis and the United States Government: A Case Study," which can be found in book form in *Radiation and Thyroid Cancer*, published in 1999 by the European Commission, DOE, the National Cancer Institute, and Cambridge University. Criticizing this "aspersion upon two internationally renowned medical experts," I urged the Commissioners to withdraw the document and issue a "deep and contrite apology" to Drs. Nauman and Wolff. The NRC Commissioners did in fact order the report withdrawn from circulation (63 FR 55653, Oct. 16, 1998), and in an implicit apology, Dr. Nauman was invited to NRC headquarters to address the relevant staff. Twice in the next several years, the NRC staff sent revised drafts of NUREG-1633 to the Commission for approval. Both were rejected. At last the Commissioners los t patience, and by a 4-1 vote, ordered work on the project to cease. Officially, therefore, the document does not exist, except as an attachment to a rejected staff proposal. But rather than being consigned to the dumpster, as the Commissioners seem to have intended, it was given new life when it was cited with evident approval in the Marburger decision referred to earlier.

ED_001057_00026684

ask the reason for the omission of the NAS study, and was informed that the authors of the draft felt that the FDA guidance from 2001 was so useful that it should be emphasized.

Leaving aside for the moment that a citation to the NAS report would hardly have detracted from whatever emphasis was given to the FDA guidance, the difficulty with this argument is that the PAGs actually **conflict** with the FDA guidance. They offer warnings about the risks of KI that are quite at odds with what the FDA said in 2001.

If we carefully compare the two, on the critical question of medical contraindications for KI use, we see subtle but extremely significant differences. First, here is the 2001 FDA guidance, at page 5:

> Short-term administration of KI at thyroid blocking doses is safe and, in general, more so in children than adults. The risks of stable iodine administration include sialadenitis (an inflammation of the salivary gland, of which no cases were reported in Poland among users after the Chernobyl accident), gastrointestinal disturbances, allergic reactions and minor rashes. In addition, persons with known iodine sensitivity should avoid KI, as should individuals with dermatitis herpetiformis and hypocomplementemic vasculitis, extremely rare conditions associated with an increased risk of iodine hypersensitivity.
>
> Thyroidal side effects of stable iodine include iodine-induced thyrotoxicosis, which is more common in older people and in iodine deficient areas but usually requires repeated doses of stable iodine. In addition, iodide goiter and hypothyroidism are potential side effects more common in iodine sufficient areas, but they require chronic high doses of stable iodine (Rubery 1990). In light of the preceding, individuals with **multinodular goiter**, Graves' disease, and autoimmune thyroiditis **should be treated with caution, especially if dosing extends beyond a few days**. The vast majority of such individuals will be adults. [Emphasis added.][7]

[7] I am grateful to Professor von Hippel for pointing out to me that the guidance on KI currently posted on the FDA website includes a line not found in the 2001 guidance: "People with nodular thyroid with heart disease should not take KI." See

ED_001057_00026684

Now let us look at EPA's draft PAGs, at p. 20:

> **Some people should not take KI**. As a rule, individuals with known allergy to iodine or with pre-existing thyroid disease (e.g., Graves' disease, **thyroid nodules**, Hashimoto's thyroiditis) that might predispose them to adverse reactions should avoid KI. [Emphasis added.]

Thus there are at least two noteworthy differences. First, "multinodular goiter," in the FDA document, has been changed to "thyroid nodules." Second, instead of saying that these patients should be "treated with caution," as FDA does, EPA tells us they should "not take" and should "avoid" KI.

To fully appreciate the pernicious impact of these changes, one must know the prevalence of thyroid nodules among the American population. Here is the first paragraph of "Nonpalpable Thyroid Nodules—Managing an Epidemic," an article by Dr. Douglas S. Ross of Massachusetts General Hospital and Harvard Medical School, published in the Journal of Clinical Endocrinology & Metabolism on May 1, 2002 (vol. 87 no. 5 1938-1940):

> **Thyroid nodules are extraordinarily common**. The prevalence of palpable thyroid nodules in two non-biased population-based studies—Framingham, Massachusetts, and Whickham, England—was 4.2 and 3.2%, respectively (1, 2). In the Framingham study, the prevalence was 6.4% in women and 1.5% in men (1). The true prevalence of thyroid nodules, however, requires autopsy data. A 1955 study at the Mayo Clinic found thyroid nodules in 50.5% of 821 consecutive autopsies of patients with clinically normal thyroid glands (3). Because 7.4% of autopsies were excluded from analysis because of premortem thyroid disease, **the true prevalence is slightly higher than half the population**. Even in an unlikely group of patients to have thyroid nodules, men in the military aged 18–39 yr, the prevalence of thyroid nodules at autopsy was 13% (4). [Emphasis

---

http://www.fda.gov/Drugs/EmergencyPreparedness/BioterrorismandDrugPreparedness/ucm072265.htm. However, in the population sought to be reached by a KI program – those below the age of 40, and above all children – there will presumably be very few individuals with both thyroid nodules **and** heart disease.

ED_001057_00026684

added.]

Whether or not by design, the effect of these selective omissions and insertions is thus to create a document that would serve as a perfect tool for persuading state, local, and federal authorities that to stockpile and administer KI is unwise, because so large a fraction of the population would be placed at risk. And as noted earlier, there will be no references to the NAS report, or to the Polish experience with KI, that might lead anyone to realize that there may be a good case for stockpiling the drug after all.

Conclusion

During the Fukushima accident, when some on the West Coast were opportunistically peddling KI to frightened citizens at high prices, I went on television in Seattle to condemn their "irresponsible scaremongering." I thought it reprehensible of these entrepreneurs to exaggerate the benefits of KI in a situation where there was no need for anyone in the United States to be taking it. But it is every bit as reprehensible, in my view, for opponents of KI to exaggerate the risks of using the drug in potential future situations where the need for it actually **does** exist or **may** exist. One form of alarmism and disinformation is no better than the other.

Rather than drafting its own list of cautions for those taking KI, EPA should simply incorporate the FDA guidance verbatim. With respect to the omission from the draft of any mention of the NAS report and the Nauman/Wolff journal article, EPA should in its revision of the draft draw attention to these documents and discuss their findings, given their central importance to a proper understanding of the KI issue.

Fortunately, no radiological event requiring KI administration has ever occurred in this country, and we hope one never does. But we know that it **could**. That makes it incumbent on government agencies and on all of us to address these issues on the basis of sound, honest, complete information: the truth, the whole truth, and nothing but the truth. Regrettably, these guidelines in their present form do not meet that test.

Nearly 20 years ago, Senators Joseph Lieberman and Alan Simpson, a Democrat and a

Republican, wrote to the NRC in an effort, futile at the time, to persuade that agency to support stockpiling of potassium iodide. (Letter of April 20, 1994.) In it, they pointedly reminded the NRC Commissioners of their "moral responsibility to provide the public with complete and accurate information" on the KI issue. Today, that moral responsibility rests with EPA, and I trust the agency will rise to it.

Finally, I recommend that EPA extend the comment period by an additional 60 days, to enable commenters to give the draft PAGs the careful scrutiny they plainly require.

Ms. Mary Lampert of Pilgrim Watch has advised me that she agrees with these comments and wishes to be associated with them.

Sincerely,

/s/

Peter Crane
NRC Counsel for Special Projects (retired)

ED_001057_00026684

Interjurisdictional Planning Committee

County of Orange•County of San Diego•City of San Clemente•City of San Juan Capistrano
City of Dana Point•California State Parks•U. S. Marine Corps•Southern California Edison

July 3, 2013

Radiation Protection Division
Center for Radiological Emergency Management
EPA - Mail Code 6608J
U. S.
1200 Pennsylvania Avenue NW
Washington DC, 20460

On behalf of the San Onofre Nuclear Generating Station Interjurisdictional Planning Committee (IPC), I respectfully submit comments for the draft EPA PAG Manual. The comments were drafted by the Orange County Health Care Agency Radiological Protection Officer and reviewed by the IPC.

The IPC appreciates the opportunity to offer comments and recommendations. Thank you for your consideration.

Sincerely,

Sara Kaminske

Sara Kaminske
Chair, Interjurisdictional Planning Committee
Assistant Emergency Manager
Orange County Sheriff's Department
Emergency Management Division

SONGS Interjurisdictional Planning Committee

Comments for the 2013 Draft PAG Manual

1. DRL Tables: The new PAG manual no longer includes DRL tables, but references them and directs users to the 2010 FRMAC Assessment Manual. However, review of this manual failed to locate DRL tables similar to the Tables 5.1, 5.2, 5.3 5.4, 5.5, and 7.1 from the 1992 PAG manual, only the algorithms to work them out. This makes the PAG manual much less useful as a one-stop document, and will be very difficult to use in an emergency. This will cause significant delay in calculations and thereby create an undue risk to the health and safety of the public.

   Recommendation: Replace in the new PAG manual DRL Tables similar to the Tables 5.1, 5.2, 5.3 5.4, 5.5, and 7.1 from the 1992 PAG manual.

2. DCF Tables: If during an emergency computers fail, OROs will have to perform dose projections by SOP and calculator. DCF tables similar to Tables 5.1, 5.2, 5.3 5.4, 5.5, and 7.1 will be required to do this. Attempting to calculate these values during an emergency based on the algorithms in the FRMAC manual will cause undue delay and could create a hazard to the safety of the public.

   Recommendations: Replace in the new PAG manual DCF tables similar to Tables 5.1, 5.2, 5.3 5.4, 5.5, and 7.1 from the 1992 PAG manual.

3. 50 Year PAG: The 50 year PAG was removed from the new PAG manual. No explanation was provided for the removal of this PAG. This was a useful value which provided an extra level of protection to the public. Unless there is a justifiable reason for the removal of this PAG, it should be left alone. Additionally, the 50 year PAG is still found in referenced FDA guidance, making that guidance conflict with the new PAG manual.

   Recommendation: Replace the 50 year PAG.

4. Water PAG: A subject of great anticipation with the new PAG manual was the inclusion of a water PAG. This is a PAG that is desperately needed by local authorities so that they have a solid value that they can use to help ensure the protection of the public, and a water PAG should be included in the manual. The new PAG manual references the NPDWR limit of 4 mR/year for Gamma, however there is no "official" PAG in the new manual.

   Recommendation: Use the NPDWR 4 mR/yr value as the water PAG in the new PAG manual.

5. Pg 24, 2.4.3.- FRMAC Guidance: This section is one of several references to the FRMAC manual to get DRLs and DCF's however these tables are not in the FRMAC guidance. Additionally this section references and recommends the use of "Turbo FRMAC", however Turbo FRMAC is not available for use from any source. Is it reasonable, desirable, or even legal for FRMAC to force all REP states to adopt FRMAC dose assessment methodologies?

   Recommendation: Restore to the new PAG manual Tables similar to the Tables 5.1, 5.2, 5.3 5.4, 5.5, and 7.1 from the 1992 PAG manual.

6. Chapter 4: This section includes guidance in the disposal of radiological contaminated waste, and indicates that federal disposal facilities could not accommodate contaminated wastes from a large radiological incident. Review of this section indicates a much greater role for local disposal of such waste than may be currently anticipated, and may require greater coordination at the local level. However, while state and local authorities have the primary role of managing and removing this waste as part of the emergency response and recovery, no authority exists below the federal level to establish a permanent radiological waste facility. Further, the radiological material associated with the contamination will still be the property of the DOE, who through that ownership, along with the NRC will be ultimately responsible for the proper disposal (Nuclear Waste Policy Act, 1992).

   Recommendation: Clarify in the document that the responsibility for the radiological waste and its disposal will ultimately belong to the Federal government.

4.1.3

2013

PAG Manual

Protective Action Guides And Planning Guidance For Radiological Incidents

U.S. Environmental Protection Agency
Draft for Interim Use and Public Comment
March 2013

ED_001057_00026684

In the early phase, there may be little or no data on actual releases to the environment and responders may have to rely on crude estimates of airborne releases. Decision time frames are short and preparation is critical to make prudent decisions when data are lacking or insufficient.

The principal protective actions for the early phase are evacuation and sheltering-in-place. These protective actions would be taken if whole body doses are projected to exceed 1 to 5 rem (10 to 50 mSv) over four days. The decision to evacuate must weigh the anticipated radiation dose to individuals in the affected population against the feasibility of evacuating within a determined time frame and the risks associated with the evacuation itself. For example, evacuating a population of 50,000 carries with it a statistical risk of injury or death from transportation hazards or increased exposure. Evacuation also takes time. In the case of an accident at an NPP, there may be sufficient time for an orderly and relatively safe evacuation. In the case of a fire or explosion of an RDD in an urban area, evacuating a large group of people could leave them exposed to the plume and actually increase radiation dose. Sheltering-in-place may be warranted in situations where evacuation poses a greater risk of exposure or physical harm.

In addition, there are actions that are advisable, but not associated with a numerical PAG. For example, individuals should be instructed to cover airways (nose and mouth) with available filtering material when airborne radionuclides may be present. Decontamination is another protective action that may be utilized in the early phase and may include washing of contaminated individuals, removing contaminated clothing and decontaminating surfaces of critical areas and objects. Further, in areas where airborne radioactivity is present but PAGs are not exceeded, officials can consider asking people to stay indoors to the extent practicable. In such cases, individuals are not prevented from carrying out necessary tasks (e.g., seeking medical care, purchasing food). Similar to actions used in major cities on high pollution days, these measures can be effective to reduce radiation doses when prolonged releases occur, as was the case for the Fukushima accident in Japan.

In cases where significant quantities of radioiodine may have been released, administration of the radioprotectant KI should be considered as a supplementary protective action if the projected child thyroid dose exceeds 5 rem (50 mSv). This PAG is lower than the 1992 guidance. The lower dose, which FDA adopted in 2001, is for protection of children based on early studies of Chernobyl exposure data.

The choice of protective action will be based on the status of the incident site and the prognosis for worsening conditions. In the early phase, precautionary actions based on worst-case scenarios may be used before implementation of protective actions based on PAGs. For example, in the case of RDD detonation, governments may instruct affected populations to shelter in place as a precautionary action while radiation levels are being measured to determine appropriate PAG-based protective actions. Officials should plan for rapid broadcast and dissemination of protective action orders to the public.

When available, predictions of radiological conditions in the environment based on an estimate of the source or actual environmental measurements may be used. Nuclear facilities, for example, have continuous, real-time radioactive effluent monitoring capabilities to monitor radioactive material released to the environment and may have a network of off-site measurement stations.

1.4.3. Intermediate Phase Protective Action Guides and Protective Actions

Intermediate phase activities are intended to reduce or avoid dose to the public, to control worker exposures, to control the spread of radioactive contamination and to prepare for late phase cleanup operations.

ED_001057_00026684

However, FDA understands that a KI administration program that sets different projected thyroid radioactive exposure thresholds for treatment of different population groups may be logistically impractical to implement during a radiological emergency. In such cases, FDA recommends that KI be administered to both children and adults at the lowest intervention threshold (i.e., >5 rem (50 mSv) projected internal thyroid exposure in children) (FDA 2002).

Note that KI is effective only against uptake of radioiodine, and is best taken prior to or just after exposure. The protective effect of a single dose of KI lasts approximately 24 hours. It should be administered daily until the risk of significant exposure to radioiodine (either by inhalation or ingestion) no longer exists.

It should be noted that adults over 40 need to take KI only in the case of a projected large internal radiation dose to the thyroid (>500 rem (5 Sv)) to prevent hypothyroidism which could lead to lifelong dependence on thyroid hormone replacement therapy. Thyroid irradiation in adults over 40 years of age is associated with an extremely low incidence of cancer (FDA 2001).

Some people should not take KI. As a rule, individuals with known allergy to iodine or with pre-existing thyroid disease (e.g., Graves' disease, thyroid nodules, Hashimoto's thyroiditis) that might predispose them to adverse reactions should avoid KI.

Pregnant women should be given KI for their own protection and for that of the fetus, as iodine (whether stable or radioactive) readily crosses the placenta. However, because of the risk of blocking fetal thyroid function with excess stable iodine, repeat dosing with KI of pregnant women should be avoided. Lactating females should be administered KI for their own protection, as for other young adults, and potentially to reduce the radioiodine content of the breast milk, but not as a means to deliver KI to infants, who should get their KI directly. As for direct administration of KI, stable iodine as a component of breast milk may also pose a risk of hypothyroidism in nursing neonates. Therefore, repeat dosing with KI should be avoided in the lactating mother, except during continuing severe contamination. If repeat dosing of the mother is necessary, the nursing neonate should be monitored.

Once the plume has passed, protective actions such as evacuation and/or sheltering-in-place and food control measures to limit exposure to radioiodine should be implemented and the administration of KI should be suspended. Food control measures include providing the public with non-contaminated food supplies while awaiting the eventual radioactive decay of contaminated food. Consumption of contaminated food may be permitted on a case-by-case basis after surveying the foodstuffs and determining the level of contamination consistent with FDA food and animal feeds guidance. As a result of radioactive decay, grain products and canned milk and vegetables from sources affected by radioactive fallout will not present a risk from radioiodine if they have been stored for weeks to months after production.

An RDD is not likely to contain radioiodine, so administration of KI would not be necessary in such incidents. The administration of other prophylactic drugs should be evaluated on a case-by-case basis depending on the nature of the event and the radioisotopes involved. For more information on radiological prophylactics and treatments, see:
http://www.fda.gov/Drugs/EmergencyPreparedness/BioterrorismandDrugPreparedness.

2.3.5. PAGs and Nuclear Facilities Emergency Planning Zones (EPZ)

Under NRC regulations, before a nuclear power reactor may be issued a license, the NRC must find that licensee, state and local emergency plans are adequate and that they can be implemented. For nuclear power reactors, there is a plume exposure EPZ within a 10 mile (16.1 km) radius of the plant and for a

ED_001057_00026684

site officials.[13] Once the initial protective actions have been implemented, accident assessment should continue. Although initial assessments may be uncertain, the subsequent assessments will be less uncertain as additional information on facility condition and prognosis, effluent radiation monitor data and environmental data become available. The results of these continuing radiological assessments, including dose projections, should be used as the basis for refining the initial protective actions. In the case of transportation accidents, an RDD or IND, or other incidents that are not related to a facility, it may not be practicable to establish EALs.

Doses that may be incurred from ingestion of food and water, long-term radiation exposure (i.e., longer than four days), radiation exposure to deposited radioactive materials, or long-term inhalation of resuspended materials are chronic exposures for which neither emergency evacuation nor sheltering-in-place are appropriate protective actions. PAGs for the intermediate phase cover these exposure pathways (see Chapter 3).

2.4.2. Duration of Exposure

The projected dose for comparison to the early phase PAGs is calculated for exposure during the first four days following the anticipated (or actual) start of a release. The objective is to encompass the entire period of exposure to the plume and deposited material prior to implementation of any further, longer-term protective action such as relocation. For planning purposes, the four-day period is chosen as the duration of exposure during the early phase because it is a reasonable estimate of the time necessary to make measurements, reach decisions and prepare to implement further protective actions (such as relocation) if necessary. However, officials at the site at the time of the emergency may decide that a different time frame is more appropriate.

For example, doses incurred through ingestion pathways or long-term exposure to deposited radioactive materials take place over a longer time period. Protective actions for such exposures should be based on guidance addressed in Chapter 3.

The projected dose from each radionuclide in a plume is proportional to the time-integrated concentration of the radionuclide in the plume at each location. This concentration will depend on the rate and the duration of the release and meteorological conditions. Release rates will vary with time and this time-dependence cannot usually be predicted accurately. In the absence of more specific information, the release rate may be assumed to be constant.

Another factor affecting the estimation of projected dose is the duration of the plume at a particular location. For purposes of calculating projected dose from most pathways, exposure will start at a particular location when the plume arrives and will end when the plume is no longer present. Exposure from deposited materials will continue for an extended period as long as people are present. Other factors such as the aerodynamic diameter and solubility of particles, shape of the plume and terrain may also affect estimated dose and may be considered on a site- or source- specific basis.

Prediction of time frames for releases is difficult because of the wide range associated with the spectrum of potential incidents. Therefore, planners should consider the possible time periods between an initiating event and arrival of a plume and the duration of releases in relation to the time needed to implement competing protective actions (i.e., evacuation and sheltering-in-place). Analyses of commercial nuclear power reactors (NRC 1975) have shown that some incidents may take several days to develop to the point of a release while others may begin as early as a half hour after an initiating event. Furthermore, the

[13] Immediate protective actions based on in-plant conditions are not applicable to naval nuclear propulsion plants. See Footnote 7 for additional information. In addition, because of differences in design and operation, EALs based on in-plant conditions are not applicable to naval nuclear propulsion plants.

ED_001057_00026684

		measure dose.
25 rem (250 mSv)[b]	Lifesaving or protection of large populations	Exceeding 5 rem (50 mSv) unavoidable and all appropriate actions taken to reduce dose. Monitoring available to project or measure dose.

[a] For potential doses >5 rem (50 mSv), medical monitoring programs should be considered.
[b] In the case of a very large incident, such as an IND, incident commanders may need to consider raising the property and lifesaving response worker guidelines to prevent further loss of life and massive spread of destruction.

The 25 rem (250 mSv) lifesaving response worker guidelines provide assurance that exposures will not result in detrimental deterministic health effects (i.e., prompt or acute effects). However, it could increase the risk of stochastic (chronic) effects, such as the risk of cancer. Response actions that could cause exposures in excess of the 25 rem (250 mSv) Response Worker Guideline should only be undertaken with an understanding of the potential acute effects of radiation to the exposed responder (see Table 2-3) and only when the benefits of the action clearly exceed the associated risks.

The estimated risk of fatal cancer[17] for workers exposed to 10 rem (100 mSv) is slightly less than the corresponding general population risk of 0.6 percent (6 cases per thousand exposed). Workers exposed to 25 rem (250 mSv) have an estimated risk of fatal cancer of 1.5 percent (15 cases perthousand exposed). Because of the latency period of cancer, younger workers face a larger risk of fatal cancer than older workers (for example, when exposed to 25 rem (250 mSv), 20 to 30-year-olds have a 9.1 per thousand risk of premature death, while 40 to 50-year-olds have a 5.3 per thousand risk of premature death).[18]

More specific risk determinations can be made when there is adequate information about the contaminants and the potential for human exposure. EPA's Federal Guidance Report #13 (EPA 1999) and Health Effects Assessment Summary Tables have risk factors for specific radionuclides.

Table 2-3. Acute Radiation Syndrome [a]

Feature or Illness	**Effects of Whole Body Absorbed Dose from external radiation or internal absorption, by dose range in rad**				
	0-100	100-200	200-600	600-800	>800
Nausea, Vomiting	None	5-50%	50-100%	75-100%	90-100%
Time of Onset		3-6 h	2-4 h	1-2 h	<1 h to minutes
Duration		<24 h	<24 h	<48 h	<48 h
Lymphocyte Count	Unaffected	Minimally Decreased	<1000 at 24 h	<500 at 24 h	Decreases within hours
Central Nervous	No	No Impairment	Cognitive	Cognitive	Rapid

[17] Risk per dose of a fatal cancer is assumed to be about $6x10^{-4}$ per rem ($6x10^{-5}$ per mSv). Cancer incidence is assumed to be about $8x10^{-4}$ per rem ($8x10^{-5}$ per mSv). (EPA 1999)
[18] The numerical estimate of cancer risk presented above (from Federal Guidance #13) was obtained by linear extrapolation using the nominal risk estimates based on data from human exposures at high doses and high dose rates. Other methods of extrapolation to the low-dose region could yield higher or lower numerical estimates of cancer deaths. Studies of human populations exposed at low doses are inadequate to demonstrate the actual magnitude of risk at low doses (about 0.1 Sv or 10 rem and below). There is scientific uncertainty about cancer risk in the low-dose region below the range of epidemiological observation and the possibility of no risk cannot be excluded. (EPA 1999)

ED_001057_00026684

events involving fixed nuclear facilities, some evacuation reception centers or shelters will have walk-through portal monitors.

2.8.1. Priorities for Control of Contaminated Areas

The following priorities are recommended—

1. Do not delay urgent medical care for decontamination efforts or for time-consuming protection of attendants, such as donning of additional anti-contamination clothing.
2. In early phase scenarios where it might not be practical or would interfere with other life-saving and public health protection priorities, do not waste effort trying to contain contaminated wash water and be sure to notify sewage treatment plants.
3. Do not allow monitoring and decontamination to delay an ordered evacuation.
4. *When early screening is needed after a major incident*— After plume passage, it may be necessary to establish emergency contamination monitoring stations in areas not qualifying as low background areas. Gamma exposure rates in such areas should be less than 5 millirem (50 µSv) per hour. These monitoring stations should be used only during the early phase after major atmospheric releases to monitor people emerging from possible high exposure areas. The stations should be set up to provide simple (rapid) decontamination if needed and to evaluate whether affected people should undergo more extensive decontamination or other special care. Table 2-5 provides guidance on surface contamination levels for use if such centers are needed.
5. Establish monitoring and personnel decontamination (e.g., bathing) facilities at evacuation centers or other locations in low background areas (less than 0.1 millirem (1 µSv) per hour). *Encourage self-decontamination:* Encourage evacuated people who were exposed in areas where release of particulate materials would have warranted evacuation to change and bag the clothes they were wearing and store them in an area away from people and pets until authorities provide further instructions on their disposition, to wash other exposed surfaces such as cars and trucks and their contents and then report to these centers for monitoring. For more specific considerations on control of contaminated areas refer to "Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners" (CDC 2007).[20] Table 2-6 provides surface contamination guidance. These screening levels are examples derived primarily on the basis of easily measurable radiation levels using portable instruments.
6. After the relocation area has been established, consider the need to set up monitoring and decontamination stations at exits from the more highly contaminated parts of the area. Low levels of contamination may be undetectable because of high background radiation levels at these locations. Monitoring should be done at lowest practical background levels. Nevertheless, these individuals should be advised to bathe and change clothes at their first opportunity—no later than within the next 24 hours. If, after decontamination, people still exceed the limits for the station, they should be sent for further decontamination or for medical or other special attention.

[20] See: http://emergency.cdc.gov/radiation/pdf/population-monitoring-guide.pdf

ED_001057_00026684

Table 2-5. Recommended Surface Contamination Screening Levels for Emergency Screening of People and Objects at Monitoring Station in High Background Radiation Areas (0.1 mR/h to 1 mR/h Gamma Exposure Rate)[a]

Condition	Appropriate detection instrument reading	Recommended Action
Before Decontamination	<2x existing background	Unconditional release
	>2x existing background	Decontaminate. Equipment may be stored or disposed of as appropriate.
After Decontamination	<2x existing background	Unconditional release
	>2x existing background	Continue to decontaminate or refer to low background monitoring and decon station. Equipment may be stored for decay or disposed of as appropriate.

[b] Monitoring stations in such ~~high~~ exposure rate areas are for use only during the early phase of an incident involving major atmospheric releases ~~of particulates~~. Otherwise use Table 2-6.

Table 2-6. Recommended Surface Contamination Screening Levels for People[a] and Objects at Monitoring Stations in ~~Low~~ Background Radiation Areas (<0.1 mR/h Gamma Exposure Rate)[b]

Condition	Appropriate detection instrument reading	Recommended Action
Before decontamination	<2x existing background	Unconditional release
	>2x existing background	Decontaminate
After simple[c] decontamination effort	<2x existing background	Unconditional release
	>2x existing background	Full decontamination
After full[d] decontamination effort	<2x existing background	Unconditional release
	>2x existing background	Continue to decontaminate people Release animals and equipment
After additional full decontamination effort	<2x existing background	Unconditional full release
	>2x existing background	Send people for special evaluation Release animals and equipment

[a] People reporting to monitoring stations in low background radiation areas have been previously instructed to change and bag clothes, wash other exposed surfaces such as cars and their contents and then report to these centers for monitoring.
[b] Levels higher than 2x existing background (not to exceed the meter reading corresponding to 0.1 mR/h) may be used to speed the monitoring of evacuees in very low background areas.
[c] Flushing with water and wiping is an example of a simple decontamination effort.
[d] Washing or gentle scrubbing with soap or other mild detergent followed by flushing is an example of a full decontamination effort.

ED_001057_00026684

In addition, measurements should be conducted to determine the dose reduction factors associated with simple, rapid, decontamination techniques so that these factors can be used in calculating dose to people who are not relocated. However, assumptions about these factors should not be included in calculating projected dose for decisions on relocation. Only dose reductions already accomplished can be considered.

3.4.4. Exposure Limits for People Reentering the Relocation Area

After the relocation area is established, people will need to reenter for a variety of reasons, including recovery activities, retrieval of property, security patrol, operation of vital services and, in some cases, care and feeding of farm and other animals. It may be possible to quickly decontaminate access ways to vital institutions and businesses in certain areas so that they can be occupied by adults either for living (i.e., institutions such as nursing homes and hospitals) or for employment. Clearance for occupancy of such areas will require dose reduction to meet exposure limits (EPA 1987). Dose projections should include both external exposure from deposited material and inhalation of resuspended deposited material for the duration of the planned exposure. People working in areas inside the emergency relocation area should operate under the controlled conditions established for occupational exposure (EPA 1987). The worker dose limitation does not need to include ongoing doses received from living in a contaminated area outside the relocation area. It is also not necessary to consider dose received previously from the plume or groundshine during the early phase of the radiological incident.

3.5. PROTECTIVE ACTION GUIDANCE FOR FOOD AND DRINKING WATER

Information on food and animal feeds protective action guidance is contained in FDA's "Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies" (FDA 1998).

EPA is not proposing a specific drinking water PAG at this time. EPA has established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act (SDWA). EPA recommends that to the extent practicable, emergency measures for drinking water be based on the National Primary Drinking Water Regulations (NPDWR) for Radionuclides. The Radionuclides Rule provides states with flexibility when responding to radiological events. If a public water system exceeds the radionuclides standard it must work to get back into compliance as soon as feasible. States have the authority to determine if other corrective actions are needed (e.g. providing alternative water).

However, the Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, an intermediate phase emergency drinking water PAG is being sought during the public review of this Manual.

While the NPDWR provide for a regulatory standard of 4 mrem/year (beta, photon emitters) based on life-time exposure, international organizations have developed technical approaches and methodologies that have produced a range of emergency guidelines related to drinking water (e.g., the World Health Organization[24], the International Atomic Energy Agency[25]) as have other federal agencies (e.g., the Department of Homeland Security[26], the Food and Drug Administration[27]) and non-federal organizations. EPA is seeking input on an approach and technical rationale for a drinking water PAG designed to help

[24] See: http://www.who.int/water_sanitation_health/dwq/gdwq3rev/en/ and http://www.who.int/hac/crises/jpn/faqs/en/index8.html.
[25] See: http://www-pub.iaea.org/MTCD/publications/PDF/Pub1467_web.pdf.
[26] See: http://ogcms.energy.gov/73fr45029.pdf
[27] See: http://www.fda.gov/downloads/MedicalDevices/.../UCM094513.pdf

ED_001057_00026684

THE ENDOCRINE SOCIETY

8401 CONNECTICUT AVENUE, SUITE 900 + CHEVY CHASE, MARYLAND + 20815-5817 + TELEPHONE 301.941.0200 + FAX 301.941.0259 + www.endo-society.org

July 15, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Ave NW
Washington, DC 20460

Re: Docket ID No. EPA-HQ-OAR-2007-0268

To Whom It May Concern:

On behalf of The Endocrine Society, we appreciate the opportunity to provide comments to the Environmental Protection Agency (EPA) regarding the EPA's ***Protective Action Guides (PAG) Manual: Protective Action Guides and Planning Guidance for Radiological Incidents*** (Fed Reg 78 FR 22257, 04/15/2013). Founded in 1916, the Society represents more than 16,000 physicians and scientists engaged in the treatment and research of endocrine disorders such as osteoporosis, diabetes, hypertension, infertility, obesity, and thyroid disease. The Society looks forward to working closely with the EPA as it engages and assists public officials in planning for an emergency response to radiological incidents.

The Society has reviewed the latest draft of the Protective Action Guide and would like to thank the Agency for its efforts to comprehensively approach the response of public officials to either the deliberate or accidental release or potential release into the environment of radioactive materials sufficient to warrant consideration of protective actions. The Society appreciates the opportunity to provide feedback to the Agency on this important threat to public health.

The Society has concerns related to the PAG's recommendations for use of potassium iodide (KI) as a thyroid blocking agent during radiological emergencies. Section 1.1 currently lists administration of KI as a supplemental action. We feel this language suggests that KI administration is a secondary or optional action to take. We believe the Agency should clearly state that KI administration (to the appropriate groups of individuals with significant exposure as recommended by the Food and Drug Administration) is a mandatory and essential action to take in the event of a radiological incident. KI should be viewed as an essential component of the response to a radiological emergency along with evacuation, sheltering and avoiding contaminated food, milk and water.

We believe Section 2.3.4 should clearly emphasize that KI is a safe and effective protective measure against the harmful thyroidal effects of radioactive iodine release. The Society supports predistribution of KI so that it can be made available to the public in as short a time as possible in the event of a significant release of radiological materials into the environment. Since KI is best taken prior to or just after exposure, we suggest the Agency modify Sections 2.3.4 and 2.3.5 to encourage the predistribution of KI so that it can be delivered and administered as quickly as possible to maximize its chances of successfully blunting the risk of exposure to radioiodine in the event of an emergency.

Thank you for the opportunity to provide input to the Agency on the proposed Protective Action Guides and Planning Guidance for Radiological Incidents. The Endocrine Society appreciates the efforts of the Agency to engage medical specialties and solicit comments, and looks forward to working with the EPA as it further develops this guide. Should you have any questions, please do not hesitate to contact Stephanie Kutler, Director of Government Affairs, at skutler@endocrine.org or (301) 941-0254.

Sincerely,

Teresa K. Woodruff, Ph.D.
President, The Endocrine Society

NRDC
THE EARTH'S BEST DEFENSE

July 15, 2013

Via Electronic Mail

U.S. Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20004

RE: Natural Resources Defense Council Comments on the EPA's DRAFT PAG Manual

Dear Sir/Madam:

The Natural Resources Defense Council (NRDC) offers the following comments regarding the Environmental Protection Agency's (EPA's) Draft "PAG Manual: Protection Action Guides and Planning Guidance for Radiological Releases," March 2013, Docket ID No. EPA-HQ-OAR-2007-0268. This manual is a proposed draft of an update of EPA's 1991 PAG Manual, 78 Fed. Reg. (15 April 2013) 22257-22260.

General Comments

The National Academies' BIER VII, Phase 2 Report gives "preferred estimates" of cancer risk per unit dose along with 95% subjective confidence intervals. The upper and lower bounds of these confidence intervals are typically a factor of two above and below the preferred estimates. In the event of a radiological accident, the bounds on the government's best estimates of effective doses to individuals—at 95% confidence—are likely to be significantly larger than a factor of two above and below the best estimates. Moreover, health risks can vary by as much as a factor of 20 depending upon the age and gender of the exposed individuals (and fetuses) and whether the government seeks to protect exposed individuals against the occurrence of cancer (morbidity) or only cancer fatality. Consequently, NRDC believes EPA can better serve the public by providing a more comprehensive discussion of risk, rather than focusing primarily on the specific dose ranges that should trigger protective actions. Further, where PAGs are offered EPA should establish separate PAGs for pregnant women, young children, average adults and senior citizens, or, in the alternative, set a single standard for all individuals at a level that protects the most vulnerable. In all cases the PAGs should be set on the basis of preventing cancer (cancer morbidity) and not just preventing fatalities.

NRDC endorses the analysis and recommendations of the group letter submitted by the Committee to Bridge the Gap, the Nuclear Information and Resource Service, NRDC and others, the conclusions of which are summarized here:

- Withdraw the 2013 EPA PAGs (Protective Action Guides)
- Do not weaken drinking water standards for radioactivity. Comply with existing Safe Drinking Water Act limits especially in the intermediate and late phases of disasters and cleanup. Provide real, concrete guidance to authorities on how to safeguard water supplies to protect the public to those levels or better.
- Eliminate any implication that EPA PAGs incorporate the worst provisions of Dept. of Homeland Security PAGS including "optimization" (a cost benefit analysis done by the polluter), use of "benchmarks" or ranges of radiation risk much higher than EPA historically allows.
- EPA should retain and strengthen, relocation PAGs for thyroid and skin doses and keep and strengthen (not weaken) the limit of 5 rem over 50 years.
- Replace the outdated FDA food contamination guidelines with markedly lower radioactivity in food.
- Do not permit nuclear waste to be disposed in regular garbage dumps, incinerators or hazardous waste sites, or sent to recyclers. Treat it like nuclear waste.
- Do not expand the PAGs, originally for big nuclear disasters, to apply to every radioactive release.
- We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

Chapter 2, Early Phase Protection Action Guides.

EPA did not update its Early Phase Protection Action Guides for sheltering-in-place or evacuation [1 to 5 rem (10 mSv to 50mSv) over 4 days], from those in EPA's 1991 PAG Manual, and did not update the cost-benefit analysis which was the basis for the 1991 recommendations. NRDC believes these Early Phase PAGs are too low by roughly an order of magnitude—roughly a factor of 10. Our reasoning follows.

First, the 1991 PAG Manual, Appendix C assessment is based on an assumed risk of $3x10^{-4}$ cancer deaths per person-rem. Since 1991, the National Academies BEIR Committee has revised its risk estimates. The BEIR VII, Phase 2 Report (2006) best estimates is $5.7x10^{-4}$ cancer fatalities per person-rem for a mixed population of all ages and both genders. The government's price deflator index has increased by about 50 percent since 1991. Therefore, updating these two quantities alone suggest the Early Phase PAGs should be reduced by a factor of 2.5 from the 1991 recommendations.

Second, while the BEIR VII, Phase 2 Report (2006) preferred estimate is 5.7×10^{-4} cancer fatalities per person-rem for a mixed population of all ages and both genders, the preferred estimate for morbidity is 26.2×10^{-4} cancers per person-rem for a population of 10 year old girls. Thus, the morbidity risk for 10 year old girls is approximately 4.6 times greater than the fatality risk for a population of all ages and both sexes, and for young female babies or fetuses the risk is estimated to be more than twice as great as that for 10 year old girls.

As noted above, EPA's Early Phase Protection Action Guides for sheltering-in-place or evacuation are 1 to 5 rem (10 mSv to 50mSv) over 4 days. Based upon the preferred estimate from BEIR VII, a 10 year old girl exposed to 0.5 rem [5 mSv] would have a 0.13 percent chance of an excess cancer—one excess cancer in a population of 765 exposed girls. BEIR VII's 95 percent confidence limits approximate a factor of two higher and lower than its preferred estimate. Surely, in a community containing 765 young girls, one would seek to shelter or evacuate these girls to avoid the expected cancer(s) (uncertainty range 0.5 to 2 cancers).

In the introduction to Chapter 2, EPA properly notes, "In all cases. All practical and reasonable means should be used to reduce or eliminate exposure." Nevertheless, this cautionary note will be lost on a reader focusing on the numerical PAGs given in Table 2-1. Both in the introduction and the tables EPA should remind government officials and the public that a basic tenet of the health physics profession is that all radiation exposures are potentially harmful and therefore any radiation exposure should be kept as low as reasonably achievable. In this regard, unlike evacuation, there is minimal risk associated with sheltering-in-place. Thus, in the event of a significant radiation release or the potential for an imminent release, sheltering-in-place may be advisable even when the projected doses are less than the PAGs.

Protective Action Guidance for Drinking Water

EPA did not propose a specific drinking water PAG. Rather, the agency seeks input on an approach and technical rationale for a drinking water PAG. (PAG Manual, p. 42) Given that bottled water is widely available commercially throughout the country, NRDC sees no necessity in relaxing the established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act (SDWA), limiting exposures from drinking water to 4 mrem per year.

Protective Action Guidance for Food

EPA endorses the PAGs contained in the FDA's "Accidental Radioactive Contamination of Human Foods and Animal Feeds: Recommendations for State and Local Agencies" (FDA 1998), PAG Manual, p. 42. As noted in the April 15, 2013, press release of the Committee to Bridge the Gap and the Nuclear Information and Resource Service (*see* Attachment A), "Extremely high food contamination levels would be allowed by the incorporation of Food and Drug Administration 1998 guidance. EPA officials had previously criticized those standards, saying that 1 in 50 people eating food at those levels would get cancer from their exposure, on top of

our normal cancer risk." EPA apparently has forgotten that it is responsible for establishing Federal Guidance for radiation protection, and that it should not accede to the recommendations of other agencies that are contrary to the EPA's record on the matter.

Conclusion

For the above reasons NRDC believes EPA should withdraw the Draft 2013 EPA Protective Action Guides and start afresh, remembering that its responsibility is to protect the public.

Thank you for your consideration of these comments. Please do not hesitate to contact us at (202) 289-6868 if you have any questions.

Sincerely,

_____/s/_____
Geoffrey H. Fettus, Esq.
Senior Project Attorney, Nuclear Program
Natural Resources Defense Council
1152 15th Street NW, Suite 300
Washington, D.C. 20005
(202) 289-6868
gfettus@nrdc.org

_____/s/_____
Thomas B. Cochran, Ph.D.
Consulting Scientist, Nuclear Program
Natural Resources Defense Council
1152 15th Street NW, Suite 300
Washington, D.C. 20005
(202) 289-6868
tcochran@nrdc.org

Attachment A

EPA Dramatically Weakens Radiation Protection

For Immediate Release
Contacts: Dan Hirsch Committee to Bridge the Gap 831 336 8003
Diane D'Arrigo Nuclear Information and Resource Service 301 270 6477 x 15

April 15, 2013 The U.S. Environmental Protection Agency (EPA) is publishing in the Federal Register today controversial new Protective Action Guides (PAGs) for responding to radioactive releases. EPA says it solicits public comment but is nonetheless making the PAGs immediately effective.

The new PAGs eliminate requirements to evacuate people in the face of high projected thyroid, skin, or lifetime whole body doses; recommend dumping radioactive waste in municipal garbage dumps not designed for such waste; propose five options for drinking water, which would dramatically increase the permitted concentrations of radioactivity in drinking water, by as much as 27,000 times, compared to EPA's current Safe Drinking Water Act limits; and suggest markedly relaxing long-term cleanup standards.

"In essence the government is now saying nuclear power accidents could produce such widespread contamination and produce such high radiation levels that the government should abandon efforts to clean it up and instead force people to live with radiation-induced cancer risks orders of magnitude higher than ever considered acceptable," said Daniel Hirsch, president of Committee to Bridge the Gap.

The PAGs are intended to guide the response to nuclear power reactor accidents (like Fukushima in Japan, Chernobyl in Ukraine and Three Mile Island in the U.S.), "dirty bomb" explosions, radioactive releases from nuclear fuel and weapons facilities, and nuclear transportation accidents.

"EPA ignores the fact that women and kids are at even greater risk from radiation. The doses permitted by the 2013 EPA PAGs will allow indecent exposures to radiation," says Diane D'Arrigo of Nuclear Information and Resource Service. "Women are 50% more vulnerable than men and children are at even greater risk from radiation than adults, according to data from the National Academy of Sciences."

Extremely high food contamination levels would be allowed by the incorporation of Food and Drug Administration 1998 guidance. EPA officials had previously criticized those standards, saying that 1 in 50 people eating food at those levels would get cancer from their exposure, on top of our normal cancer risk.

The PAGs also incorporate and expand controversial Dept. of Homeland Security (DHS) PAGs adopted in 2008 which would allow long-term doses as high as thousands of millirems per year without cleanup being required. Associated guidance for carrying out the long-term cleanup, prepared for DHS and for which the comment period expires today, recommends abandoning EPA's long-held cleanup standards and instead allowing people to be exposed to doses as high as the equivalent of three chest X rays a day for one's entire life. Over 70 years, EPA estimates 1 in 6 people would get cancer from exposure that high, orders of magnitude higher risk than EPA has historically said is acceptable.

In addition, EPA admits that a nuclear power accident could far exceed the capacity of radioactive waste sites to manage waste generated from cleanups and therefore suggests allowing the waste to go to regular trash dumps, a fight the public has waged for decades in the US.

For more information: www.committeetobridgethegap.org and www.bit.ly/radstandards

15 July 2013

From: International Atomic Energy Agency - Incident and Emergency Centre

To: U.S. Environmental Protection Agency

SUBJECT: COMMENTS ON U.S. EPA PAG MANUAL

1. The International Atomic Energy Agency would like to submit the following comments on the recently published PAG Manual by the U.S. EPA. The specific changes are recommended in Annex A.
    a. In section 1.3.1 (Legal Basis) and 3.5 (Protective Actions Guidance for Food and Drinking Water), the EPA seeks input on an approach and technical rationale for a drinking water PAG. Detailed guidance on this is provided in IAEA General Safety Guide No. GSG-2, *Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency*, particularly in Appendix II. It is recommended that the EPA take this international guidance into consideration in the elaboration of its approach on the subject.
    b. In section 1.3.2, (Technical Basis), the document quotes an old IAEA reference. The more correct reference would be Safety Standards Series No. GS-R-2 (IAEA 2002). The change should also be made in the reference section.
    c. In section 3.4.2, (Dose Projection), the document states "In addition, the FRPCC encourages the use of computational tools […] to implement PAGs." The IAEA recommends caution in the use of computer models during an emergency. A recently published IAEA guide, EPR-NPP Public Protective Actions 2013, *Actions to Protect the Public in an Emergency due to Severe Conditions at a Light Water Reactor*, states in section 2.3 (Tools to Support Protective Action Decision Making), "The control room operators cannot predict the timing, magnitude, composition, effective height and duration of most severe releases warranting urgent protective actions off the site. In addition, such a release could occur over several days resulting in very complex deposition patterns off-site. Consequently, dose projection models cannot be effectively used for making decisions concerning urgent protective actions that need to be taken before or shortly after the release in order to be most effective." The IAEA guidance recognizes that models may be useful, but later in the emergency: "After a release, wind directions and models may be useful in initially directing resources for off-site monitoring and sampling. [..]Dose projection models and other computer-based tools could also be used to assess environmental monitoring data in order to develop deposition and dose maps for decision-making."

To: U.S. Environmental Protection Agency
Center for Radiological Emergency Management

From: California Governor's Office of Emergency Services
Radiological Preparedness Unit

Subject: PAG Comments - Docket ID No. EPA-HQ-OAR-2007-0268

The California Governor's Office of Emergency Services would like to submit the following comments on the Draft PAG Manual.

1. *General Comment:* Removing the reference material and directing the reader to myriad additional references reduces the usefulness of this document. In addition, some of the referenced reports are copyrighted materials and require a fee to access. In an emergency the ability to obtain the many referenced documents may be severely limited, causing an undue risk to the public.

   R*ECOMMENDATION:* Incorporate the information applicable for the development of radiological response plans and protective action decision making.

2. *General Comment:* Portions of the document rely heavily on acronyms. Individuals that are not familiar with these acronyms will struggle with understanding the intended message. For example: See the first paragraph under Section 3.4.2, page 40.

   RECOMMENDATION: All acronyms should be reintroduced at the beginning of each section.

3. *General Comment:* The use of website links should be avoided unless the EPA intends to update this document frequently. These links change over time as do the originating documents – keep in mind that it has been 21 years since the last PAG revision.

   RECOMMENDATION: Remove the website links. State the controlling agency and reference document name.

4. *General Comment:* The EPA PAG document changes convert the existing PAG Manual into merely a list of other agencies PAGs. Exclusion of PAGs for drinking water, agriculture, Potassium Iodide administration, and other applicable standards creates the need for agencies to adopt multiple standards and refer to multiple documents for applicable guidance.

ED_001057_00026684

RECOMMENDATION: Include the applicable PAG's in the appropriate sections of the document.

5. Pages 9, 54, 69, 75, 76, and more. New terminology: Please examine your use of the terms "Reoccupancy" and "Return". The term "Return" has been used in the prior EPA PAG and in NPP emergency planning. Is there a need to differentiate between the two? Both are the return of populations to areas where the public has been ordered to leave (evacuation or relocation) and both allow for the public to return to areas with "acceptable" levels of contamination. It is reasonable to allow Return with restrictions.

   RECOMMENDATION: Pick one or provide a clear difference between them that does not confuse readers.

6. Page 15, Table 2-1, Footnote "a". The statement "Sheltering may begin at lower levels if advantageous" is unclear. Is the lower level between 1 and 5 rem? Or below 1 rem?

   RECOMMENDATION: Change the statement to say "Sheltering may begin at levels below 1 rem if advantageous".

7. Page 21, Footnote 10. The footnote expresses the opinion that since NNPP reactors are 1/5 the size of a commercial reactor and operated at only 1% power near port, then there is "no need for towns and cities to have special emergency response plans such as those required for cities near commercial NPPs"

   Commercial reactors are in the range of 1000Mw and 1/5 of that is 200Mw. NUREG 0654/FEMA REP 1 requires all commercial power plants over 50Mw to have extensive response plans and programs within the Emergency Planning Zones around the power plant, regardless of operating levels. This appears to contradict the statement that there is no need for special emergency response plans.

   RECOMMENDATION: Remove the last sentence of the footnote starting with "therefore there is no need…" Replace with "The Navy will work with affected jurisdictions to develop coordinated emergency plans for response to a Navy Nuclear Propulsion emergency."

8. Page 22, Section 2.4, Projected Dose. Referencing the FRMAC manuals for "detailed methods for estimating projected Dose…" indicates that the methods necessary to implement this document are located elsewhere. For the purposes of this draft, are we expected to review the FRMAC manual to ensure this section is correct?

   RECOMMENDATION: Include the methods for estimating projected dose in this manual.

9. Page 22, Section 2.4, Projected Dose. The last sentence in this section states "EROs are encouraged to use the most current, applicable tools and methods for implementing PAGs." Unfortunately the tools are not listed nor is there a list of the most accurate, and there is also no mention as to which is most appropriate.

ED_001057_00026684

RECOMMENDATION: Remove this sentence.

10. Page 13, Section 2.1 and Page 24, Section 2.4.3. The exclusion of Dose Conversion Factors (DCF), Derived Response Levels (DRL) and calculation methodologies makes this document more of a discussion of good ideas rather that a technical standard and reference document.

    RECOMMENDATION: Include DCFs, DRL, and calculation methodologies. Update the EPA PAGs as appropriate to maintain consistency.

11. Page 25, Section 2.6. NCRP documents are listed. These documents are not freely available and may not be available in an emergency.

    RECOMMENDATION: Add applicable information from the cited NCRP documents into the PAG.

12. Pages 26 and 27, Table 2.2, Response Worker Guidelines

    RECOMMENDATION: In the final publication, do not split tables.

13. Page 30 and 32, Section 2.7 last paragraph and tables 2-5, 2-6. The term two times the existing background is used. Does this mean twice the background above background or once above background: If background is 18 cpm, then is 2x background – 18+18 =36cpm or is it 36cpm above background, which is 18 cpm, so a meter reading of 54cpm?

    Conditions in our region have backgrounds from very low to relatively high levels. At the low end, simple dirt can double the background, but 2x the background above the background would indicate a real source of radiation.

    RECOMMENDATION: Either place a numerical limit such as "100 cpm" or explain 2 x background.

14. Page 30, Section 2.7. In the last sentence, the term restricted area is used. Restricted area was removed from Figure 3-1 and is not defined anywhere.

    RECOMMENDATION: Define this term or remove it.

15. Pages 31 and 32, Section 2.8.1 (4) uses the measurement "gamma exposure rates in millirem/per hour" where in tables 2-5 and 2-6 "mR/h gamma" is used.

    RECOMMENDATION: Use consistent terms to reduce confusion; mR/h gamma.

16. Page 32, Table 2-6. The term "Simple Decontamination" should be used to clarify the screening process for people in the Recommended Action column, Before Decontamination row.

    RECOMMENDATION: Add the term Simple Decontamination

ED_001057_00026684

17. Page 35, Section 3.3. The third paragraph down references the basis for the PAG value in the prior PAG manual.
    RECOMMENDATION: Insert those basis discussions in the new PAG manual.

18. Page 35, Footnote 21 cites the 1998 FDA PAGs.

    RECOMMENDATION: Insert (return) the 1998 FDA PAGs to the manual.

19. Page 35, Section 3.3. The 50 year dose PAG has been removed. It provided additional long term safety for the public. No reasoning is provided for its removal.

    RECOMMENDATION: Return the 50 year dose PAG.

20. Page 36, Table 3-1, Footnote c. Remove this footnote as it is not achievable during the ingestion or intermediate phase of the emergency. Removal of soil would require much more explanation.

    RECOMMENDATION: Remove the statement "minor removal of soil from spots where radioactive materials have concentrated".

21. Pages: 37, Section 3.3.2. New terminology: The term Restricted Zone has been replaced with Relocation Area. The terms Restricted Zone helps to clearly define an area that has a hazard (and therefore requires limitations and/or controls) and it is easily understood by the general public and non-technical responders.

    RECOMMENDATION: Use the term Restricted Zone.

22. Page 42, Section 3.5 second paragraph. Drinking water PAG. The EPA should include a drinking water PAG into this manual. Use the standard NPDWR 4mrem/year based on lifetime exposure as the standard.

    RECOMMENDATION: Include a drinking water PAG utilizing the NPDWR 4 mrem/year standard.

23. Page 51, Section 4.4.1. The transition from intermediate phase to late phase cleanup is much like the transition from emergency operations to recovery operations. There is no clear dividing line where one ends and the other begins and there is a time where these activities occur concurrently. The law designates different lead agencies as responsible for leading the response and cleanup efforts. While the priority should be the intermediate phase activities for protection of human health, considerations of long term cleanup should be made in the decision making process. This becomes important for public information, resource management, laboratory prioritization, etc. All decisions should be coordinated and decisions for cleanup should not be made independently between a response group and a cleanup group.

ED_001057_00026684

RECOMMENDATION: Discuss the use of Unified Command and coordination of decision making responsibility, resources, and facilities during the transition from the Intermediate to Late Phase Cleanup.

24. Page 53, Section 4.1.3. The paragraph starting with "Community..." The discussion that recommends using a range of one in a population of then thousand to one in a population of one million excess cancer incidence outcomes is generally considered protective for both chemical and radioactive carcinogenic contaminant exposures." This should be converted into a PAG for recovery and not presented as an option.

    RECOMMENDATION: Make this discussion into a PAG for recovery.

25. Pages 55 – 59, Section 4.1.6. Why provide an example? The example is subjective, situational, and based on unrealistic assumptions. Each and every situation where wide spread contamination is present will be different.

    RECOMMENDATION: Remove the example. The concepts that support the example have been sufficiently discussed.

26. Page 59, Section 4.2. The primary decisions fall to state and local officials on waste management, however the capacity and responsibility to effect that waste management falls to the federal government. No authority exists at the state level to establish a radioactive waste facility, only federal authorities can allow legally.

    RECOMMENDATION: Following the sentence on state and local decisions add "the federal government has the responsibility to develop the capacity for large scale radioactive waste management.

27. Page 64, last bullet on the page starting with "It is anticipated..." This statement is speculative and only the federal government can approve the creation of a radioactive waste facility.

    RECOMMENDATION: Remove this bullet.

28. Consider adding the following terms to the Glossary:

    Early Phase, Intermediate Phase, Late Phase – Page 5 lists all three and gives definition so it might be appropriate to also add these to glossary.

    Cloudshine – Page 7 mentions both groundshine and cloudshine in the lower portion of Table 1-1. Groundshine is listed in the glossary but cloudshine is not.

    Shelter-in-Place – Page 7 lists shelter-in-place as a protective action recommendation and should be listed in glossary.

ED_001057_00026684

29. Consider adding the following to the list of Acronyms:

Sv and rem – Listed on page 7 and throughout document.

REMM – Radiological Emergency Medical Management mentioned on page 28.

RESRAD-RDD – Mentioned on Page 46.

NDRF – National Disaster Recovery Framework mentioned on page 55.

PCB's – Mentioned on page 62.

DIL – Derived Intervention Level listed in glossary but not in acronyms list.

REM – roentgen equivalent man listed in glossary but not in acronyms list.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SECRETARY

July 10, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Ave., NW
Washington, DC 20460

Attention: Docket ID No. EPA-HQ-OAR-2007-0268

Re: Comments on EPA's 2013 PAG Manual – Protective Action Guides and Planning Guidance for Radiological Incidents

To Whom It May Concern:

In 78 FR 22257, the Environmental Protection Agency (EPA) announced availability of the document, "2013 PAG Manual – Protective Action Guides and Planning Guidance for Radiological Incidents" (2013 PAG Manual) for interim use and public comment. The 2013 PAG Manual is intended to update the guidance provided by EPA in the 1992 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (1992 PAG Manual), EPA 400-R-92-001, May 1992.

The Pennsylvania Department of Environmental Protection (DEP) has reviewed the revised 2013 PAG Manual and wishes to submit the following comments:

A. Issues Across the Scope of the Entire PAG Manual:

1. Reliance on FRMAC Resources and NRC RASCAL in Place of Tables Found in 1992 PAG Manual: Section 3.4.2 and 3.4.3 (p. 40-43): The 1992 PAG Manual contained numerous tables of Dose Conversion Factors (DCFs), Derived Response Levels (DRLs), and conversions from deposition to dose rate, to assist State and Local agencies in evaluating accident conditions. These tables are absent from the 2013 PAG Manual, and instead users are referred to the Federal Radiological Monitoring and Assessment Center (FRMAC) and Nuclear Regulatory Commission (NRC) resources.

   DEP strongly believes that the 2013 PAG Manual should incorporate the applicable tables of DCFs, DRLs, and conversions from deposition to dose rate. State and Local governments need a readily accessible, authoritative source of this information included with the PAG guidance. Our plans and procedures need to state explicitly what DCFs, DRLs, and conversions from deposition to dose rate will be used in accident/emergency conditions to evaluate the situation. Removing these tables from the 2013 PAG Manual will result in uncertainty and ambiguity over the best values to use, and cause confusion and delay in evaluating accident/emergency conditions.

2. No PAG for Drinking Water: Section 1.4.3 (p. 8-10), Section 3.5 (p. 42-45): The 2013 PAG Manual refers to the National Primary Drinking Water Regulations (NPDWR) for Radionuclides for standards for Drinking Water. The 2013 PAG Manual does not provide PAGs for drinking water. The 2013 PAG Manual solicits input on PAGs for Drinking Water.

ED_001057_00026684

provide PAGs for drinking water. The 2013 PAG Manual solicits input on PAGs for Drinking Water.

As demonstrated during the 2011 Fukushima nuclear power plant accident, reliance on the NPDWR levels for accident conditions is not feasible. A drinking water PAG for accident/emergency conditions is needed.

It is of great concern that, after 21 years since the issuance of the 1992 PAG Manual, the EPA still has not issued PAGs for drinking water for accident/emergency situations and is only now soliciting input to aid it in the development of drinking water PAGs. In 73 FR 45029, "Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents," (Federal Emergency Management Agency (FEMA), Department of Homeland Security, August 1, 2008) in Table 1, a PAG for Drinking Water Interdiction of 0.5 rem projected dose in the first year was stated.

DEP strongly recommends EPA examine the RDD/IND guidance from 73 FR 45029 and the PAGs for food interdiction issued by the U.S. Food and Drug Administration (FDA), and issue a drinking water PAG consistent with the RDD/IND guidance and FDA's food interdiction PAG.

B. Chapter 2 – Early Phase

3. Administration of KI: Section 2.3.4 (p. 19-20) contains a discussion of KI administration. The 2001 FDA Guidance was complex, and simplified guidance would be welcome. However, the 2013 PAG Manual does not provide clear, simplified guidance on administration of KI. The discussion in the 2013 PAG Manual would benefit from the inclusion of a table specifying EPA's recommendations in terms of radiation dose for administration, age of the individual, and milligrams of KI to be given.

4. Skin and Thyroid PAGs Removed: The 2013 PAG Manual drops the skin and thyroid PAGs for evacuation. It is not clear what criteria EPA used in making this decision. States cannot evaluate the EPA's decision without having the details of how EPA arrived at this decision. EPA should provide a detailed analysis of how the decision to drop the skin and thyroid evacuation threshold was made.

C. Chapter 3 – Intermediate Phase

5. Removal of 50-Year Relocation PAG: DEP supports the removal of the 50-year Relocation PAG.

6. Combined Intermediate Phase PAG: DEP would support the development of a new combined Intermediate Phase PAG, considering all exposure pathways. The development of such a PAG would simplify decision making.

D. Chapter 4 – Late Phase

7. Planning Guidance for Late-Phase Cleanup: The planning guidance on Late-Phase Cleanup in Section 4.1 (p. 51-59) is of modest value as a general reference. It sketches

the broad issues involved in cleanup. No numerical cleanup criteria or limits are provided. DEP believes that State plans addressing Late Phase Cleanup will not be more specific than the outline provided in the 2013 PAG Manual, since cleanup decisions and criteria will be decided by Federal, State and Local authorities collaborating together.

8. Radioactive Waste Disposal: Section 4.2 (p. 59-68) restates EPA's position that "Primary responsibility for waste management decisions falls to state and local officials." A large radiological release, such as one resulting from a nuclear power plant accident, RDD, or IND, could generate massive amounts of radioactive waste, far beyond the ability of any state or local government's ability to manage or afford. EPA needs to develop a realistic strategy for addressing the radioactive waste issue, instead of simply declaring that state and local governments are responsible. We are unaware of any state or local government that has embraced that responsibility.

E. Other Items:

9. Nomenclature of Dose Terms: Section 2.4 (p. 22), Appendix B (p. 74-77): The 2013 PAG Manual uses a nomenclature for Dose Terms different from that used in the 1992 PAG Manual (and different from 10 CFR Part 20).

1992 PAG Manual (and 10 CFR Part 20)	2013 PAG Manual
Total Effective Dose Equivalent (TEDE)	Total Effective Dose (TED)
Committed Effective Dose Equivalent (CEDE)	Committed Effective Dose (CED)
Effective Dose Equivalent (EDE)	Effective Dose (ED)
Committed Dose Equivalent (CDE)	None – (Does use 'Thyroid Equivalent Dose' in Table 1-1 (page 7))

Also, Table 1-1 does not make clear that the PAG dose numbers are in terms of Total Effective Dose (TED) [formally Total Effective Dose Equivalent (TEDE)].

DEP believes that the use of a nomenclature for dose terms in the 2013 PAG Manual that is different from that used in the 1992 PAG Manual and 10 CFR Part 20 is unnecessary and could be confusing to those not familiar with new international nomenclature. DEP recommends the 2013 PAG Manual use dose terms consistent with those used in the 1992 PAG Manual and 10 CFR Part 20. The new nomenclature can be used when [if] NRC, Department of Energy, EPA and Occupational Safety and Health Administration's respective radiation protection regulations are updated and codified as final.

10. Recommended Surface Contamination Screening Levels: Table 2-5 (p. 32): The 2013 PAG Manual lists Recommended Surface Contamination Screening Levels as a multiple of background (typically < or > 2x existing background). FEMA REP-22, "Contamination Monitoring Guidance for Portable Instruments Used for Radiological Emergency Response to Nuclear Power Plant Accidents," (FEMA, October 3, 2002) gives guidance on Surface Contamination Screening Levels that are in counts per minute (cpm). The 2013 PAG Manual and FEMA REP-22 are not consistent in this area.

In this case, the FEMA REP-22 guidance is more helpful. It states contamination limits in terms of cpm, which is the unit used for evaluation of surface contamination. DEP recommends EPA examine its surface contamination screening levels, and ensure they are consistent with the FEMA REP-22 guidance.

11. 2 Rem First-Year Relocation PAG Adequate for Children and Fetuses: Section 3.3.1 (p. 36): The 2013 PAG Manual states that the 2 rem First-Year Relocation PAG provides adequate protection for children and fetuses. The 1992 EPA PAG Manual, Section E2.1.2, recommends that pregnant women be relocated if the projected dose during pregnancy cannot be reduced below 0.5 rem. For this reason, Pennsylvania currently uses a First-Year Relocation PAG of 0.5 rem. DEP asks EPA to provide a detailed explanation as to why the EPA now believes a 2 rem First-Year Relocation PAG provides adequate protection for a child and/or a fetus.

Thank you for the opportunity to provide comments on the PAG Manual. Should you have any questions or need additional information, please contact Vincent J. Brisini, Deputy Secretary for Waste, Air, Radiation and Remediation, by e-mail at vbrisini@pa.gov or by telephone at 717.772.2724. You may also contact David J. Allard, CHP, Director of the Bureau of Radiation Protection, by e-mail at djallard@pa.gov or by telephone at 717.787.2480.

Sincerely,

E. Christopher Abruzzo
Acting Secretary

Air and Radiation Docket

EPA – Mail Code 6102T

1200 Pennsylvania Ave NW

Washington, DC 20460

JUL 30 2013

19 July, 2013

We were informed that the EPA will reissue guidelines KI prophylaxis in case of reactor accidents. To my reading there are some unfortunate changes in the current version of the PAG which require return to previous versions published by the FDA, and similar recommendations published by the National Council on Radiation Protection, and by virtually all thyroid specialists in the US, Europe or Japan. These will be mentioned below. I have worked on the mechanism of KI-induced inhibition of the thyroid gland for many years and the efficacy and safety of thyroid blockade have been confirmed by nearly all thyroid specialists interested in these questions. Such studies are independent of the nuclear industry or its allies at the NRC.

If we are ever to succeed in CO2 mitigation, nuclear energy will likely play a major role. Yet there is world-wide distrust of the industry because of accidents, re-approval of ancient reactors, failure to deal with spent fuel disposal, and the seemingly cavalier attitude toward public safety even to a minor step such a protection against radioiodine fallout. It is thus important to deal with these issues. While a number of these are difficult, KI-based protection is not; it is cheap, effective, and safe.

Only one study exists on the safety of mass distribution of KI (Nauman, J. & Wolff, J. Am. J. Med. 94:524-532, 1993) and this should be mentioned. From that it is clear that the benefit/risk ratio is very high. Moreover, the statement that people with Graves' disease, *multi*nodular goiter (not nodules) or Hashimoto's thyroiditis should **not** take KI should be modified to read "should be apprised of possible side reactions" when high level contamination by radioiodine change that balance between risks. E.g. a possible transient episode of hypothyroidism after KI is preferable to a possible thyroid cancer. Furthermore, since leaks may persist or recur, repeat dosing may be required. Similar reasoning applies to pregnancy and lactation. Thus, if anything, the FDA guidelines should be strengthened no weakened.

JUL 23 2013

Other points should be clarified or discussed. Because speed of response is critical, pre-distribution of KI is essential. For this, foil-wrapped KI is ideal. It is cheap, has a very long shelf-life (and a 5-10% loss will not matter), and distribution can be handled by public health authorities. As for the 10 mile distribution radius, it is obviously too small despite objections from the nuclear industry. (E.g. rare gas isotopes from TMI reached Buffalo, NY in 24 hours and Chernobyl contamination reached Sweden in a similar time frame). This old controversy may seem beyond the scope of the present PAG but remains a critical part of KI protection.

It remains incomprehensible to me and many others in the thyroid field why the nuclear industry, with its bad reputation, keeps fighting a simple, effective and inexpensive measure to protect public health, even if it were done only for public relations. The EPA, on the other hand, exists to protect the public and should insist on the strongest proposals for thyroid gland protection as established by literally hundreds of thyroid specialists.

Thank you for your attention,

Jan Wolff

Jan Wolff MD, PhD

7917 Deepwell Dr.

Bethesda, MD. 20817

Page	Table/ Appendix	(E)dit/ (Q)question/ (C)omment	Comment
9		E	"for out years" is not intuitive phrasing, consider rephrasing. Perhaps, "for alternate years."
9		Q	"0.5 rem... in any subsequent year" and "0.5 rem… the second year and beyond" Used to be for just for the 2nd year we would calculate. How many subsequent years should we calculate for the PAG? 5th year? 10th year? Or until the DIL is below a certain level?
10		C	"EPA is seeking input on an approach and technical rationale for a drinking water PAG." Yes, a drinking water PAG should be implemented. However, a guidance document is not the place to be "seeking input." If input is received and then put into the final document, the public will not have the opportunity to comment on the new information.
12		Q	What "incident specific circumstances?"
13		Q	Does Rascal "project doses for four days?"
15	2-1	Q	This table shows the PAG as 1-5R. It does not state whether this is for TEDE, CDE(thyroid), or something else.
15	2-1	Q	Will FEMA accept plans that do not provide KI at 5R? For example, if emergency workers currently receive KI at 25R, this document is "guidance" and not "mandatory," can the 25R be used instead of the 5R?
15		C	"The basis for the PAGs for the early phase is given in Appendix C of the 1992 PAG Manual, available online as a historical reference…" The new PAG Manual is meant to supersede the 1992 manual. The 1992 manual should not be considered a reference. If the basis needs to be referenced, include it as an appendix in the new manual.
15		Q	"This conclusion was based primarily on EPA's determination concerning acceptable levels of risk of health effects from radiation exposure in an emergency situation, while weighing costs and risks associated with any protective action." How did EPA determine what the acceptable levels of risks were?
16		Q	How do you predict "potential failure scenarios" such as a "fire in the structure?" If you begin to take into account all of the things that could possibly happen that would cause "unavoidable dose," you'd never let anyone evacuate or shelter in place!
16		Q	What conditions would justify evacuation at conditions under 1R ?
17		Q	"Shelters should be opened to vent any airborne radioactivity trapped inside…" If "venting" is an important process, then why is it not recommended for other people sheltered in place, such as homes and businesses? Also, shelters should be beyond the 10-mile EPZ. How much "airborne radioactivity" will they experience?
18		E	"Regardless of size, large or small" - "Large or small" is not necessary to this sentence.
18		Q	Were there no casualties due to a "direct result of the evacuation" from Katrina? Or were the evacuation casualties not as big as Rita's were?
20		Q	Does the 5R KI intervention level apply to emergency workers?

ED_001057_00026684

20		Q	The 1998 FDA guidance states nothing about the FDA understanding that during a radiological emergency it will be "logistically difficult" to administer varying doses of KI to the population. How do we know that the FDA understands? Does EPA just assume that FDA must understand that problem?
21		C/Q	EPA should not be telling non-NPP sites that they should develop EPZs and send material to the public with the EPZ regularly. If the regulating authority of that site sees fit, then guidance should be developed and perhaps new rules to be created. Do you make the EPZs conform, or do you have different facilities with EPZs of 1-mi, 3-mi, 8-mi, etc? Do you create an ingestion planning zone guidance? If yes, do you have different IPZs based on the variable EPZ? Do the facilities need to put out agricultural brochures to farmers within the IPZ? Who will develop the guidance for this? Will it be regulated? By who?
26	2-2	Q	The 5R activity should not be referred to as "all occupational exposures." We are talking emergency response, a one time dose. It has nothing to do with occupational exposure. "Occupational exposure" is referred to throughout the document. There are only a few instances where this is applicable.
26		Q	What is a "sub-chronic" risk? Would that be acute?
27	2-2[b]	Q	Why should incident commanders raise "the property and lifesaving response worker guidelines?" What is the thought process here? You don't need to "raise" the limits. 25R should remain the limit for lifesaving. By leaving it as such, EW, who go into situations where >25R is possible, should be told the risks and remain volunteers.
28		Q	EW should be provided a "thorough" explanation of the risks with exposures >5R. How thorough is "thorough?" It is possible to do JIT and do a thorough job?
29	2-4[2]	E	Why do previous tables use the alphabet ([b]) and this table uses numbers ([1])? Why do the numbers ([1]) have a period after them? A period is needed after [2] "...emergencies."
30		E	"not people or animals" could be rephrased… maybe "neither people nor animals" or change it to something like "objects and food?"
30		Q	It is unlikely that "all such people" would have been relocated within a few days.
30		Q	What is the basis for using "one year" as the duration of the intermediate stage? It states "for purposes of dose projection." Does this mean that the one year is not taken into account by any PAG?
32	2-5	E	"[b]" should be "[a]"
34		Q	Is the intermediate phase considered to last one year because the relocation PAG is in one-year calculations? Or would there be another reason?
35		Q	Why is the 1992 PAG Manual referred to in the new manual? The new manual is to "update" the old manual. It should not be referred to even as a historical document. If there is anything in the manual that needs to remain as the current guidance, then it should be transferred into the "update."
36	3-1	E	
39		Q	"Buffer zones are set with the understanding that conservatism is inherent in the PAGs." What type of buffer would you recommend then? 10%? 1/2 mile? Or is there enough conservatism in the PAGs that a buffer zone is not really needed anymore?
40		Q	"Initially...detectability is limited to exposure rate changes of a few times natural background...more sensitive measurements detect levels of radioactivity that area small fraction of the natural background." Does this mean that readings will be less than background? Or should readings be background plus a small fraction of that number?

ED_001057_00026684

40		Q	"periods of interest are the first…and subsequent years" How many years? Do you redo calculations every year so that you have an updated subsequent year data? If I redo the data every year, then would the 1st year reset to that year or is it counted as a subsequent year?
41		E	"for out years" Consider rephrasing.
41		E	In "[23]," "on line" should be online.
41		Q	What circumstance would cause "withdrawal of food or water from use would pose a health risk in itself.
41		Q	Why is the 1992 PAG Manual referred to in the new manual? The new manual is to supersede the old manual. It should not be referred to even as a historical document.
42		C	In 3.4.4, if one is speaking of "occupational exposure," then consider removing the word "emergency" from "emergency relocation." If the early phase is determined to be the "emergency," then relocation is no longer part of the "emergency."
42		C	The "Radionuclides Rule" was developed by EPA, this deals with radionuclides in drinking water. Although it may seem inappropriate for FDA to not develop the accepted drinking water PAG, the "Radionuclides Rule" sets a precedent for an EPA created rule. The limits in the "Radionuclides Rule" were most likely conservative. If so, review data used to determine those limits, then choose limits that are still conservative (just not as conservative). Or, if you are deferring to the FDA for KI guidance, perhaps you consider deferring to their drinking water standards.
42		Q	Define "short-term."
42		Q	If "it is also not necessary to consider dose received…during the early phase," can you better define the end of the "early phase?"
43		E	"In the event of a radiological event the state, at…" Needs a comma between event and the
45		Q	Under what circumstances would you relocate people "even if the first-year dose is lower than the relocation PAG?"
46		E	Recommend putting commas around "temporarily."
46		Q	"[34]" notes that the Operational Guidelines are in draft form. When is the document expected to be finalized? Should the PAG Manual refer to the information in the Operational Guidelines when the document may be changed?
46		Q	This states that the Intermediate Phase could last from weeks to months. Why then do we consider it as lasting one year? Does that give accurate calculations?
46		Q	Why not give a number instead of referencing "typically received from cosmic radiation during an international flight?"
47			the first 4 days are the early phase. Intermediate starts at 30 days!
48		E	Reconsider "term of art."
50		Q	What is the SDWA? You should put verbiage in with the last
51		E	"The late phase cleanup process begins sometime" - Consider removing "sometime." The sentence sounds less vague and elementary as "the late phase cleanup process begins after the commencement."
53		E	"the adverse impacts on…" has a space in front of it that should be deleted
54		E	"the technical and administrative…." has a space in front of it that should be deleted

ED_001057_00026684

55		C	I don't understand why EPA feels the need to detail in such detail how our recovery should be coordinated with citizens and a broad group of stakeholders. Sentences such as "Empowering individuals to assist in the process is important and effective," is irrelevant of the protective action guidelines this manual was designed for.
56		E	Change "field data are lacking" and "field data are available" to "field team data is…"
56		Q	"the intermediate phase protective actions continue to apply through the late phase until cleanup is complete." This indicates that the intermediate does not end until the late phase ends. Yet the remainder of the document does not say that, indicating that the intermediate is separate (though overlapping) the early and late phases. If the intermediate does not end until the late phase, then there could be just two phases - emergency and non-emergency. Technically there are some intermediate protective actions that will continue for years to come, such as relocation. Are you saying the intermediate phase is the later phase?
57		Q	Is 4.1.5 necessary to this document? Is it necessary to detail the NIMS and NRF structures in this PAG manual?
58		Q	What is "environmental fate and transport modeling?'
59		E	Should "incident specific" be "incident-specific?'
64	App C	E	LLRWP does not have a description of the acronym on page 64, nor in Appendix C.
65		C	4.2.4.a talks about potential preparedness activities. It is not PAG guidance, it is pre-incident actions
65		C	Re: "establishing generally applicable criteria…" Some states and locals may not have the experience, qualifications, manpower, etc to establish criteria. Plus you are now involving hazardous waste employees at the state level who have limited resources to develop criteria. Then in order for landfills to accept these "general applicable criteria," you must create a regulation to send forward and get the state congress to approve new rules.
65		C	Does the Federal government have the capability to "fund federal research into behavior…in…landfills?'
65		E	4.2.4.a - the line should be underlined to be consistent with the remainder or the document
65		E	4.2.3.b's bullets should not be indented and be of a solid color like 4.2.4.a's below it
65		E/C	4.2.4.b is entitled "Detailed Guidance." It is one sentence long. Perhaps you should rephrase or add more detail.
65		Q	Re: "It *may* be inappropriate for the federal government to develop detailed guidance…" If there is an event odds are that the deposition of the plume, in the case of an NPP, will be across state lines. If each state has different guidelines addressing "waste disposal at RCRA disposal facilities, safety evaluation of existing disposal facilities, or siting, development and regulatory approval of new disposal facilities," chaos may ensue. Do you expect each state to provide their own guidance for these items? Do you believe that every state will immediately develop these guidelines when there is no requirement to do so? If an event occurs, it is unlikely that all the states involved will have these guidelines in place. At that point, the federal government will go in and create guidelines for them.
66		E	Add a comma after the ")" in "located) if the site is suitable.'
66		Q	What if we end up with HLRW? What will you do with that?
66		Q	Why is disposal assumed to be at 30 feet?
66		Q	How does considering sites in different regions of the country limit transportation demands?

ED_001057_00026684

67		E	Usually when indenting another bullet, there is more than one item to list. Do these two items need to have a single bullet below them, could they be merged, or could there be more from the sentence above that could make a second bullet?
67		Q	Is "action to facilitate" a necessary phrase in this document?
68		Q	Why mention properties in rugged terrains that would be difficult, if not impossible, to use?
69		C	Compensation, and Liability Act (CERCLA) "gives the Federal Government the authority to respond to releases or threatened releases of hazardous substances (including radionuclides) that may endanger public health or the environment." "Typical response actions include, but are not limited to: … waste treatment, storage, and
69		C	"Incidents that create large volumes of waste from a wide-scale radiological incidents would likely overwhelm existing radioactive waste disposal activity." Guidance should help resolve problems.
69		Q	Re: "PAGs will not be used to guide restoration and recover of areas impacted by a radiological incident." This is the EPA "PAG" Manual. If no PAGs will be used, then why provide guidance for it?
69		Q	Re: "Following a nuclear accident, the states bear primary responsibility to identify and provide waste management options." If the accident involves a NPP, shouldn't they bear the responsibility? And unless the event is terrorist in nature, the federal government will not assist in the waste management in anyway?
69		Q	The Nuclear/Radiological Incident Annex (NRIA) states radioactive waste storage and disposal is "typically the
69		Q	Now that the National Response Framework has eliminated the term "Incident of National Significance" it seems like it eliminated the Federal responsibility during a nuclear accident. It paves the way so that the Federal responsibility is only activated during a terrorist attack. If the President issues a disaster declaration, would the Federal government "offer the range of assistance to state governments to identify and implement waste management options?"
70		E	To be consistent with the rest of the document "DOD" should be changed to "DoD.
75	App B	E	The description for Dose projection needs a period at the end
75	App B	E	"Hasimoto's" should be "Hashimoto's."
75	App B	Q	Do the noble gases need to be capitalized? Consider adding chemical symbol (e.g. He, Xe) to the sentence.
76	App B	C	"Quality of a material" does not seem to adequately explain radioactive. Consider rephrasing.
76	App B	E	Should there be a comma between diagnosis and cure for the definition of a radiopharmaceutical?
76	App B	Q	Is a release of radioactivity always considered "uncontrolled distribution of… material to the environment?" Or are there times you might consider it controlled?
76	App B	Q	Recovery is defined as "the process of reducing radiation exposure rates and concentrations of radioactive material in the environment to levels acceptable for unconditional occupancy or use." Sometimes during recovery, it is impossible to reduce radiation to levels for unconditional use. If that is the case, when does recovery end?
76	App B	Q	Should relocation be solely applicable to "households?'
76	App B	Q	Does "reoccupancy" mean return to "relocation areas" or return to evacuated and "relocation areas?
78	App C	E	Add DIL to the list of acronyms.
78	App C	E	Consider adding AEA to the list of acronyms.
78	App C	E	Consider adding ICRU to the list of acronyms.

ED_001057_00026684

79	App C	E	To be consistent, capitalize LLRW's "radioactive waste."
79	App C	E	Consider adding REMM to the list of acronyms.
79	App C	E	Consider adding NDRF to the list of acronyms.
21[10]		C/Q	If NPPs are required to be prepared for hostile actions, then towns where nuclear propulsion vessels dock should consider the same preparations. It seems like a naval vessel would be just as likely a target for hostile actions. What radiation levels would be released if a nuclear naval vessel was bombed? Would it be enough to be of concern to the general population in the area? What distances could deposition occur, is it far enough to be of concern to the agricultural community?
1/4		Q	What "brief planning guides" are you referring to? If it's within the manual, it needs to be clarified
4/12		Q	We cannot review the referenced document "…Publication 60 series…" because it must be purchased. Can you describe how the dosimetry for the PAGs was updated?
5/6		C	The reference to the Early Phase in the second paragraph seems to contradict the description on page 5. Page 6 indicates the phase begins earlier than when the protective actions start. The "Early Phase" description on page 5 indicates the beginning of the phase is when protective actions are first required. To us, that says the Early Phase doesn't start until either Alert or possibly as late as the SAE.
27/28	2-3	E	You have plenty of room to change "h" to "hr." If you must split the table across pages, do not split a row and add a header to the 2nd page. Keep the ">" next to the "20 h."
27/28	2-2/2-3	E	Do not split tables across pages. If you must, then put the header on both pages
67/68		Q	Why mention "use of withdrawn lands to manage radiological waste would violate those statutes?" If there is no possibility for the Secretary of DoD to make an exception to this like the previous example, why mention it?
cover		Q	Should we refer to the document as the PAG Manual and no longer reference EPA 400'
		C	A lot of this document is not guidance on protective actions. It is more a white paper on how to go about planning and managing an event and it's progression.
		Q	I contacted a group asking how to get TurboFRMAC because I couldn't find a link. They wrote back that the "program seems to be discontinued by the developer." How can I get a copy of TurboFRMAC? And if it is truly discontinued, should you use it as a recommended dose projection software?
		Q	If this is a "draft for **interim use** and public comment," should we be following this guidance now?
		Q	The 5R emergency worker limit is repeatedly referred to as the "general occupational guideline." Any part of the emergency worker's 5R dose does not count towards a person's yearly occupational exposure. It is supposed to be a "one time" dose. By referencing the occupational exposure, it makes it sound like I will have to not only track an EW exposure, but I will have to also find out where they are in their occupational exposure and add the two together. I do not believe that is the intent, but it sounds like the 5R occupational and emergency are one and the same. It is confusing.
			EPA is the "coordinating agency" for certain scenarios, as noted in the NRF Nuclear/Radiological Annex. They are not the lead agency for basically anything under DOE, DHS, DOD, USCG, or NRC. Why are they speaking to DOE disposal sites and such?
			I don't understand why the EPA PAG Manual is telling us that we have include stakeholders? Or that we need to be using NRF/NIMS?

ED_001057_00026684

Page	Table/ Appendix	(E)dit/ (Q)question/ (C)omment	Comment
9		E	"for out years" is not intuitive phrasing, consider rephrasing. Perhaps, "for alternate years."
9		Q	"0.5 rem... in any subsequent year" and "0.5 rem… the second year and beyond" Used to be for just for the 2nd year we would calculate. How many subsequent years should we calculate for the PAG? 5th year? 10th year? Or until the DIL is below a certain level?
10		C	"EPA is seeking input on an approach and technical rationale for a drinking water PAG." Yes, a drinking water PAG should be implemented. However, a guidance document is not the place to be "seeking input." If input is received and then put into the final document, the public will not have the opportunity to comment on the new information.
12		Q	What "incident specific circumstances?"
13		Q	Does Rascal "project doses for four days?"
15	2-1	Q	This table shows the PAG as 1-5R. It does not state whether this is for TEDE, CDE(thyroid), or something else.
15	2-1	Q	Will FEMA accept plans that do not provide KI at 5R? For example, if emergency workers currently receive KI at 25R, this document is "guidance" and not "mandatory," can the 25R be used instead of the 5R?
15		C	"The basis for the PAGs for the early phase is given in Appendix C of the 1992 PAG Manual, available online as a historical reference…" The new PAG Manual is meant to supersede the 1992 manual. The 1992 manual should not be considered a reference. If the basis needs to be referenced, include it as an appendix in the new manual.
15		Q	"This conclusion was based primarily on EPA's determination concerning acceptable levels of risk of health effects from radiation exposure in an emergency situation, while weighing costs and risks associated with any protective action." How did EPA determine what the acceptable levels of risks were?
16		Q	How do you predict "potential failure scenarios" such as a "fire in the structure?" If you begin to take into account all of the things that could possibly happen that would cause "unavoidable dose," you'd never let anyone evacuate or shelter in place!
16		Q	What conditions would justify evacuation at conditions under 1R ?
17		Q	"Shelters should be opened to vent any airborne radioactivity trapped inside…" If "venting" is an important process, then why is it not recommended for other people sheltered in place, such as homes and businesses? Also, shelters should be beyond the 10-mile EPZ. How much "airborne radioactivity" will they experience?
18		E	"Regardless of size, large or small" - "Large or small" is not necessary to this sentence.
18		Q	Were there no casualties due to a "direct result of the evacuation" from Katrina? Or were the evacuation casualties not as big as Rita's were?
20		Q	Does the 5R KI intervention level apply to emergency workers?

ED_001057_00026684

20		Q	The 1998 FDA guidance states nothing about the FDA understanding that during a radiological emergency it will be "logistically difficult" to administer varying doses of KI to the population. How do we know that the FDA understands? Does EPA just assume that FDA must understand that problem?
21		C/Q	EPA should not be telling non-NPP sites that they should develop EPZs and send material to the public with the EPZ regularly. If the regulating authority of that site sees fit, then guidance should be developed and perhaps new rules to be created. Do you make the EPZs conform, or do you have different facilities with EPZs of 1-mi, 3-mi, 8-mi, etc? Do you create an ingestion planning zone guidance? If yes, do you have different IPZs based on the variable EPZ? Do the facilities need to put out agricultural brochures to farmers within the IPZ? Who will develop the guidance for this? Will it be regulated? By who?
26	2-2	Q	The 5R activity should not be referred to as "all occupational exposures." We are talking emergency response, a one time dose. It has nothing to do with occupational exposure. "Occupational exposure" is referred to throughout the document. There are only a few instances where this is applicable.
26		Q	What is a "sub-chronic" risk? Would that be acute?
27	2-2[b]	Q	Why should incident commanders raise "the property and lifesaving response worker guidelines?" What is the thought process here? You don't need to "raise" the limits. 25R should remain the limit for lifesaving. By leaving it as such, EW, who go into situations where >25R is possible, should be told the risks and remain volunteers.
28		Q	EW should be provided a "thorough" explanation of the risks with exposures >5R. How thorough is "thorough?" It is possible to do JIT and do a thorough job?
29	2-4[2]	E	Why do previous tables use the alphabet ([b]) and this table uses numbers ([1])? Why do the numbers ([1]) have a period after them? A period is needed after [2] "...emergencies."
30		E	"not people or animals" could be rephrased… maybe "neither people nor animals" or change it to something like "objects and food?"
30		Q	It is unlikely that "all such people" would have been relocated within a few days.
30		Q	What is the basis for using "one year" as the duration of the intermediate stage? It states "for purposes of dose projection." Does this mean that the one year is not taken into account by any PAG?
32	2-5	E	"[b]" should be "[a]"
34		Q	Is the intermediate phase considered to last one year because the relocation PAG is in one-year calculations? Or would there be another reason?
35		Q	Why is the 1992 PAG Manual referred to in the new manual? The new manual is to "update" the old manual. It should not be referred to even as a historical document. If there is anything in the manual that needs to remain as the current guidance, then it should be transferred into the "update."
36	3-1	E	
39		Q	"Buffer zones are set with the understanding that conservatism is inherent in the PAGs." What type of buffer would you recommend then? 10%? 1/2 mile? Or is there enough conservatism in the PAGs that a buffer zone is not really needed anymore?
40		Q	"Initially…detectability is limited to exposure rate changes of a few times natural background...more sensitive measurements detect levels of radioactivity that area small fraction of the natural background." Does this mean that readings will be less than background? Or should readings be background plus a small fraction of that number?

ED_001057_00026684

40		Q	"periods of interest are the first…and subsequent years" How many years? Do you redo calculations every year so that you have an updated subsequent year data? If I redo the data every year, then would the 1st year reset to that year or is it counted as a subsequent year?
41		E	"for out years" Consider rephrasing.
41		E	In "[23]," "on line" should be online.
41		Q	What circumstance would cause "withdrawal of food or water from use would pose a health risk in itself."
41		Q	Why is the 1992 PAG Manual referred to in the new manual? The new manual is to supersede the old manual. It should not be referred to even as a historical document.
42		C	In 3.4.4, if one is speaking of "occupational exposure," then consider removing the word "emergency" from "emergency relocation." If the early phase is determined to be the "emergency," then relocation is no longer part of the "emergency."
42		C	The "Radionuclides Rule" was developed by EPA, this deals with radionuclides in drinking water. Although it may seem inappropriate for FDA to not develop the accepted drinking water PAG, the "Radionuclides Rule" sets a precedent for an EPA created rule. The limits in the "Radionuclides Rule" were most likely conservative. If so, review data used to determine those limits, then choose limits that are still conservative (just not as conservative). Or, if you are deferring to the FDA for KI guidance, perhaps you consider deferring to their drinking water standards.
42		Q	Define "short-term."
42		Q	If "it is also not necessary to consider dose received…during the early phase," can you better define the end of the "early phase?"
43		E	"In the event of a radiological event the state, at…" Needs a comma between event and the.
45		Q	Under what circumstances would you relocate people "even if the first-year dose is lower than the relocation PAG?"
46		E	Recommend putting commas around "temporarily."
46		Q	"[34]" notes that the Operational Guidelines are in draft form. When is the document expected to be finalized? Should the PAG Manual refer to the information in the Operational Guidelines when the document may be changed?
46		Q	This states that the Intermediate Phase could last from weeks to months. Why then do we consider it as lasting one year? Does that give accurate calculations?
46		Q	Why not give a number instead of referencing "typically received from cosmic radiation during an international flight?"
47			the first 4 days are the early phase. Intermediate starts at 30 days!
48		E	Reconsider "term of art."
50		Q	What is the SDWA? You should put verbiage in with the last
51		E	"The late phase cleanup process begins sometime" - Consider removing "sometime." The sentence sounds less vague and elementary as "the late phase cleanup process begins after the commencement."
53		E	"the adverse impacts on…" has a space in front of it that should be deleted.
54		E	"the technical and administrative…." has a space in front of it that should be deleted.

ED_001057_00026684

55		C	I don't understand why EPA feels the need to detail in such detail how our recovery should be coordinated with citizens and a broad group of stakeholders. Sentences such as "Empowering individuals to assist in the process is important and effective," is irrelevant of the protective action guidelines this manual was designed for.
56		E	Change "field data are lacking" and "field data are available" to "field team data is…"
56		Q	"the intermediate phase protective actions continue to apply through the late phase until cleanup is complete." This indicates that the intermediate does not end until the late phase ends. Yet the remainder of the document does not say that, indicating that the intermediate is separate (though overlapping) the early and late phases. If the intermediate does not end until the late phase, then there could be just two phases - emergency and non-emergency. Technically there are some intermediate protective actions that will continue for years to come, such as relocation. Are you saying the intermediate phase is the later phase?
57		Q	Is 4.1.5 necessary to this document? Is it necessary to detail the NIMS and NRF structures in this PAG manual?
58		Q	What is "environmental fate and transport modeling?"
59		E	Should "incident specific" be "incident-specific?"
64	App C	E	LLRWP does not have a description of the acronym on page 64, nor in Appendix C.
65		C	4.2.4.a talks about potential preparedness activities. It is not PAG guidance, it is pre-incident actions.
65		C	Re: "establishing generally applicable criteria…" Some states and locals may not have the experience, qualifications, manpower, etc to establish criteria. Plus you are now involving hazardous waste employees at the state level who have limited resources to develop criteria. Then in order for landfills to accept these "general applicable criteria," you must create a regulation to send forward and get the state congress to approve new rules.
65		C	Does the Federal government have the capability to "fund federal research into behavior…in…landfills?"
65		E	4.2.4.a - the line should be underlined to be consistent with the remainder or the document.
65		E	4.2.3.b's bullets should not be indented and be of a solid color like 4.2.4.a's below it.
65		E/C	4.2.4.b is entitled "Detailed Guidance." It is one sentence long. Perhaps you should rephrase or add more detail.
65		Q	Re: "It *may* be inappropriate for the federal government to develop detailed guidance…" If there is an event, odds are that the deposition of the plume, in the case of an NPP, will be across state lines. If each state has different guidelines addressing "waste disposal at RCRA disposal facilities, safety evaluation of existing disposal facilities, or siting, development and regulatory approval of new disposal facilities," chaos may ensue. Do you expect each state to provide their own guidance for these items? Do you believe that every state will immediately develop these guidelines when there is no requirement to do so? If an event occurs, it is unlikely that all the states involved will have these guidelines in place. At that point, the federal government will go in and create guidelines for them.
66		E	Add a comma after the ")" in "located) if the site is suitable."
66		Q	What if we end up with HLRW? What will you do with that?
66		Q	Why is disposal assumed to be at 30 feet?
66		Q	How does considering sites in different regions of the country limit transportation demands?

ED_001057_00026684

67		E	Usually when indenting another bullet, there is more than one item to list. Do these two items need to have a single bullet below them, could they be merged, or could there be more from the sentence above that could make a second bullet?
67		Q	Is "action to facilitate" a necessary phrase in this document?
68		Q	Why mention properties in rugged terrains that would be difficult, if not impossible, to use?
69		C	Compensation, and Liability Act (CERCLA) "gives the Federal Government the authority to respond to releases or threatened releases of hazardous substances (including radionuclides) that may endanger public health or the environment." "Typical response actions include, but are not limited to: … waste treatment, storage, and
69		C	"Incidents that create large volumes of waste from a wide-scale radiological incidents would likely overwhelm existing radioactive waste disposal activity." Guidance should help resolve problems.
69		Q	Re: "PAGs will not be used to guide restoration and recover of areas impacted by a radiological incident." This is the EPA "PAG" Manual. If no PAGs will be used, then why provide guidance for it?
69		Q	Re: "Following a nuclear accident, the states bear primary responsibility to identify and provide waste management options." If the accident involves a NPP, shouldn't they bear the responsibility? And unless the event is terrorist in nature, the federal government will not assist in the waste management in any way?
69		Q	The Nuclear/Radiological Incident Annex (NRIA) states radioactive waste storage and disposal is "typically the
69		Q	Now that the National Response Framework has eliminated the term "Incident of National Significance" it seems like it eliminated the Federal responsibility during a nuclear accident. It paves the way so that the Federal responsibility is only activated during a terrorist attack. If the President issues a disaster declaration, would the Federal government "offer the range of assistance to state governments to identify and implement waste management options?"
70		E	To be consistent with the rest of the document "DOD" should be changed to "DoD."
75	App B	E	The description for Dose projection needs a period at the end.
75	App B	E	"Hasimoto's" should be "Hashimoto's."
75	App B	Q	Do the noble gases need to be capitalized? Consider adding chemical symbol (e.g. He, Xe) to the sentence.
76	App B	C	"Quality of a material" does not seem to adequately explain radioactive. Consider rephrasing.
76	App B	E	Should there be a comma between diagnosis and cure for the definition of a radiopharmaceutical?
76	App B	Q	Is a release of radioactivity always considered "uncontrolled distribution of… material to the environment?" Or are there times you might consider it controlled?
76	App B	Q	Recovery is defined as "the process of reducing radiation exposure rates and concentrations of radioactive material in the environment to levels acceptable for unconditional occupancy or use." Sometimes during recovery, it is impossible to reduce radiation to levels for unconditional use. If that is the case, when does recovery end?
76	App B	Q	Should relocation be solely applicable to "households?"
76	App B	Q	Does "reoccupancy" mean return to "relocation areas" or return to evacuated and "relocation areas?"
78	App C	E	Add DIL to the list of acronyms.
78	App C	E	Consider adding AEA to the list of acronyms.
78	App C	E	Consider adding ICRU to the list of acronyms.

ED_001057_00026684

79	App C	E	To be consistent, capitalize LLRW's "radioactive waste."
79	App C	E	Consider adding REMM to the list of acronyms.
79	App C	E	Consider adding NDRF to the list of acronyms.
21[10]		C/Q	If NPPs are required to be prepared for hostile actions, then towns where nuclear propulsion vessels dock should consider the same preparations. It seems like a naval vessel would be just as likely a target for hostile actions. What radiation levels would be released if a nuclear naval vessel was bombed? Would it be enough to be of concern to the general population in the area? What distances could deposition occur, is it far enough to be of concern to the agricultural community?
1/4		Q	What "brief planning guides" are you referring to? If it's within the manual, it needs to be clarified.
4/12		Q	We cannot review the referenced document "…Publication 60 series…" because it must be purchased. Can you describe how the dosimetry for the PAGs was updated?
5/6		C	The reference to the Early Phase in the second paragraph seems to contradict the description on page 5. Page 6 indicates the phase begins earlier than when the protective actions start. The "Early Phase" description on page 5 indicates the beginning of the phase is when protective actions are first required. To us, that says the Early Phase doesn't start until either Alert or possibly as late as the SAE.
27/28	2-3	E	You have plenty of room to change "h" to "hr." If you must split the table across pages, do not split a row and add a header to the 2nd page. Keep the ">" next to the "20 h."
27/28	2-2/2-3	E	Do not split tables across pages. If you must, then put the header on both pages.
67/68		Q	Why mention "use of withdrawn lands to manage radiological waste would violate those statutes?" If there is no possibility for the Secretary of DoD to make an exception to this like the previous example, why mention it?
cover		Q	Should we refer to the document as the PAG Manual and no longer reference EPA 400?
		C	A lot of this document is not guidance on protective actions. It is more a white paper on how to go about planning and managing an event and it's progression.
		Q	I contacted a group asking how to get TurboFRMAC because I couldn't find a link. They wrote back that the "program seems to be discontinued by the developer." How can I get a copy of TurboFRMAC? And if it is truly discontinued, should you use it as a recommended dose projection software?
		Q	If this is a "draft for **interim use** and public comment," should we be following this guidance now?
		Q	The 5R emergency worker limit is repeatedly referred to as the "general occupational guideline." Any part of the emergency worker's 5R dose does not count towards a person's yearly occupational exposure. It is supposed to be a "one time" dose. By referencing the occupational exposure, it makes it sound like I will have to not only track an EW exposure, but I will have to also find out where they are in their occupational exposure and add the two together. I do not believe that is the intent, but it sounds like the 5R occupational and emergency are one and the same. It is confusing.
			EPA is the "coordinating agency" for certain scenarios, as noted in the NRF Nuclear/Radiological Annex. They are not the lead agency for basically anything under DOE, DHS, DOD, USCG, or NRC. Why are they speaking to DOE disposal sites and such?
			I don't understand why the EPA PAG Manual is telling us that we have include stakeholders? Or that we need to be using NRF/NIMS?

ED_001057_00026684

Utility Radiological Safety Board of Ohio

September 4, 2013

Per the Federal Register announcement of April 15, 2013 I am submitting comments on the revisions to the Protective Action Guidance Manual on behalf of the Utility Radiological Safety Board of Ohio.

- On page 41 the PAG manual refers the reader to the 1992 PAG Manual to see calculations related to the calculation of the ingestion phase limits of 2 REM for the first year limit and 0.5 REM for subsequent years. Adding these calculations to the new PAG Manual as an attachment or appendix would capture the related information in a single place for ease of use.

- On page 42 **Section 3.5 Protective Action Guidance for Food and Drinking Water**

  EPA should recommend a PAG based upon known and measurable health effects resulting from exposure to radiation (e.g., . Chernobyl). With the extreme uncertainties of health risks resulting from such low level doses, it is highly inappropriate to set a limit of 4 mRem/yr, inclusive of background, as the drinking water guidance during a radiological emergency. A more reasonable approach would be to treat water as food and use the Derived Intervention Level set by the US FDA, especially given that the increased rate of child thyroid cancer at Chernobyl was due to consumption of contaminated food stuff. Emphasis should also be given to an explanation that this limit does not apply to surface water, such and lakes, ponds, streams or reservoirs, but only applies to potable water.

  Below is supporting documentation, from IAEA Safety Guide No. GS-G-2.1

  STOCHASTIC EFFECTS

  2.8. Only the exposure of many tens of thousands of people to whole body doses in the range of 100–200 mSv [10 – 20 rem] or of many tens of thousands of children to thyroid doses of the order of 50 mSv [5 rem] (i.e. at dose rates thousands of times higher than those due to background levels of radiation) could result in a detectable increase in the incidence of cancer among those population groups exposed. Even emergencies that have led to the exposure of very large groups of people (e.g. the Chernobyl accident) who received doses well above those due to background levels of radiation have not resulted in a detectable increase in the incidence of solid cancers among those exposed. [6]

  2.9. Typically, following a nuclear or radiological emergency a number of people (not all of whom may be experts) will make estimates of a radiation induced increase to be

ED_001057_00026684

expected in the incidence of cancers and other effects (e.g. birth defects) that may appear among those population groups who were exposed to radiation as a result of the emergency. Such stochastic health effects would not be individually attributable to radiation exposure (as they could not be distinguished from health effects with other causes). Estimates of consequences for a population may be made on the basis of the collective radiation dose (i.e. the sum total of all individual doses in an exposed population, expressed in man-sieverts) and levels of radiation health risks derived from observations made on exposed population groups who received high radiation doses (e.g. survivors of the atomic bombing in Japan). However, health consequences to be expected are generally estimated for people who have received only low radiation doses. In estimating such health consequences certain assumptions have to be made because of scientific uncertainties concerning the biological effects of radiation exposure at low doses and low dose rates. For the purposes of the system of radiation protection the assumption is made that there is no threshold level of radiation dose below which there is no associated radiation risk. This is only an assumption, however; data on radiation health risks that are yielded by studying the effects of exposure at high doses are not directly applicable for low dose exposure. Moreover, the very small projected increases in the incidence of cancers among those people exposed with such low levels of dose would in any case be undetectable epidemiologically against the fluctuations in the spontaneous incidence. Incautious estimates of the health effects of low dose exposures have led to what many consider is an exaggerated view on the part of the public of the risks associated with radiation, and consequently in inappropriate and, in some cases, counterproductive and harmful 'protective' actions being taken by the public and by officials. Risks of stochastic effects occurring as a result of low radiation doses (e.g. lower than 100 mSv) that are quantified for the purposes of radiation protection should therefore be interpreted for and communicated to the public with great caution, if at all. Any such quantification should be accompanied by a plain language explanation that makes it clear that, for such low doses, any radiation induced increase in the incidence of health effects in a population would be inherently very difficult, if not impossible, to detect. This plain language explanation should also discuss the risks and consequences of any actions taken to reduce the risks associated with exposure. If others (e.g. official or unofficial parties within or outside the State) make such estimates, consideration should be given to providing a clear explanation that puts these estimates in perspective.

[6] *As of 2000 no excess solid cancers had been observed among the approximately 200 000 people who performed recovery operations within the 30 km zone in 1986–1987 where the highest doses were received following the Chernobyl accident. However, a major increase was detected in the incidence of thyroid cancer among those persons who had received radiation doses as a fetus or child following the Chernobyl accident. This detectable increase in incidence in this population group was due to a very large release of radioiodine, resulting in high thyroid doses in hundreds of thousands of children (primarily due to the consumption of contaminated milk and leafy vegetables). This radiation induced rise in cancer incidence was easily detected epidemiologically because of the very low spontaneous rate of thyroid cancers among the children.*

2.10. One of the important goals of emergency preparedness is to prevent, to the extent practicable, the occurrence of stochastic effects. Since it is assumed that any dose, no matter how small, can increase the risk of occurrence of a stochastic effect, ***it would be impracticable and probably harmful to attempt to reduce the dose, and thus its associated***

ED_001057_00026684

risk, resulting from an emergency to near zero. In fact, some actions taken to reduce the risk of stochastic effects (e.g. relocation from an area with insignificant levels of contamination) may do more harm than good. *The difficulty lies in determining what is practicable and reasonable. To address this issue, international standards provide generic intervention and action levels at which various protective measures would be justified on radiation protection grounds [2].* ***Taking protective action at levels significantly below these levels could do more harm than good.***

IAEA Safety Guide No. GS-G-2.1
Arrangements for Preparedness for a Nuclear or Radiological Emergency

NOTE: Emphasis is added to the original documentation.

- Section 4.6.1 on page 55 provides an example of the late phase following an incident based on a radiological dispersal device (RDD) scenario. This scenario assumes the federal government will be the source of funds for the recovery effort. An example based on a nuclear power accident with a discussion of the fiscal roles played by the utility, American Nuclear Insurers (ANI), and the federal government would be helpful.

- Page 58 of the PAG manual discusses the establishment of technical and stakeholder working groups to advise/concur with proposed clean-up actions. Assuming a nuclear power plant accident, does the guidance envision including utility representatives in these working groups?

Sincerely,

Nancy J. Dragani, Chair
Utility Radiological Safety Board

NJD:mlb

ED_001057_00026684

American Water Works Association

Government Affairs Office
1300 Eye Street NW
Suite 701W
Washington, DC 20005-3314
T 202.628.8303
F 202.628.2846

September 10, 2013

U.S. Environmental Protection Agency
Air and Radiation Docket and Information Center
Mail Code: 6102T
1200 Pennsylvania Ave NW.
Washington, DC 20460

RE: Updates to Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents, Docket ID No. EPA–HQ–OAR–2007–0268

Dear Sir or Madam,

The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our membership includes more than 4,000 utilities that supply roughly 80 percent of the nation's drinking water and treat almost half of the nation's wastewater. Our 50,000-plus total membership represents the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians, and others who hold a genuine interest in water, our most important resource. AWWA unites the diverse water community to advance public health, safety, the economy, and the environment.

In response the request for comments issued April 15, 2013, 78 FR 22257, regarding the *Protective Action Guides and Planning Guidance for Radiological Incidents*, AWWA is submitting comments focused on drinking water as specified below (EPA comment request in bold):

1. ***EPA is seeking input on an approach and technical rationale for a drinking water PAG designed to help officials select protective actions under emergency conditions when exposures would occur over shorter time periods than those envisioned in the National Primary Drinking Water Regulation (NPDWR).*** (3.5. Protective Action Guidance for Food and Drinking Water, page 42)

Rather than relying on drinking water regulations with regard to a potential intermediate phase PAG for drinking water, the Agency should consider the following approach:

- Establish PAGs for drinking water consistent with PAGs for food interdiction; i.e., 0.5 rem/yr (500 mrem/yr) during the intermediate period. This could be applied in limited situations when alternative water sources are inadequate or otherwise compromised.
    - For ^{131}I, with a concentration of 3 pCi/L (= 4 mrem/yr), the average concentration over a year giving a dose of 500 mrem would be 375 pCi/L.
    - For ^{137}Cs, with a concentration of 200 pCi/L (= 4 mrem/yr), the average concentration over a year giving a dose of 500 mrem would be 25,000 pCi/L.

- This framework can be compared with the drinking water MCL for beta-photo emitters of 4 mrem/yr and background radiation of ~300 mrem/yr.

- An alternative approach would be to limit the dose to 4 mrem during a short exposure period (e.g., the first 4 days of the early period)
    - For ^{131}I, the concentration of 3 pCi/L (= 4 mrem/yr) for 730 liters drunk over 1 year would be equivalent to 8 liters of water containing 274 pCi/L of ^{131}I consumed in 4 days.
    - For ^{137}Cs, the concentration of 200 pCi/L (= 4 mrem/yr) for 730 liters drunk over 1 year would be equivalent to 8 liters of water containing 18,250 pCi/L of ^{137}Cs consumed in 4 days.
    - This would require explanation from EPA and State officials that this equivalent dosage is acceptable under the emergency conditions.

- For the late phase when recovery actions take place, the use of drinking water regulations (at entry points to the distribution system) would be appropriate.

2. ***To determine if there is radiological contamination of drinking water sources and the extent to which such contamination is occurring, systems sampling for radionuclides must use approved EPA methods.*** (3.5.1. Monitoring & Characterization of Contaminants , page 43)

In an emergency situation, AWWA recommends that EPA allow the methods that are most simple and rapid in order to aid in getting the quickest possible decisions about the safety of the water supply. Methods such as those referenced in ***Rapid Radiochemical Methods For Selected Radionuclides In Water For Environmental Restoration Following Homeland Security Events*** should be acceptable under emergency conditions. It worth noting that AWWA has previously recommended that the Agency address the variability associated with current drinking water compliance methods (Eaton et al., 2011).[1] Any such determination should be issued in an updated and revised version of ***Standardized Analytical Methods for Use During Homeland Security Events***.

[1] Eaton, A., Cha, Y., Geddes, L., & Morley, K.M. (2011). Evaluation of variability in radionuclide measurements in drinking water. *Journal - American Water Works Association*, *103*(5), 119-130.

3. ***During a radiological event, water systems may be dealing with a number of requirements and operating procedures and may not be prepared to issue public notification. The state may issue public notification on behalf of the water system.*** (3.5.2. Public Notification, page 43)

During an emergency, especially one related to a radiological incident, either the State or EPA would presumably take lead responsibility for public notification. This would not be unlike large events such as Superstorm Sandy, where the State was often the principle means for notification for situation awareness, including in the case of water systems informing the public of boil water notices. During such emergencies the water system resources are likely to be strained. Water system focus should be on returning the water supply to a safe condition as soon as possible, and EPA or state authorities should assume responsibility for communicating with the public. However, in conformity with the Incident Command System, the water utility personnel should be involved with and be present during any briefings, press conferences or other any public communications appearances.

4. ***Water distribution systems all incorporate reserve and storage capacity. During the early phase of an incident it is unlikely that contamination could affect water which is directly available for consumption through distribution systems. It would take some time for radionuclides to be deposited from the plume into the supply system water source and then subsequently be distributed. During the early phase, recommendations to the public (i.e., about drinking tap water) should reflect these considerations. The public should be advised that the water is safe to drink unless otherwise informed by state officials. Some useful and practical actions water systems can take during the intermediate phase to provide drinking water to customers are described below.*** (3.5.3. Corrective Actions to Reduce Levels of Contamination, page 43-45)

We question the assumptions that the Agency is making in regards to distribution system reserve/storage capacity as we believe they are naïve. First, not all systems have significant reserve and storage capacity, and the proposal does not account for factors that could be unique to those systems with open finished water reservoirs. It should also be noted that storage capacity will be significantly influenced by the time of day and time of year; therefore the Agency should consider a worst reasonable case scenario where storage is at a minimum and the treatment plant(s) are running at full capacity to meet peak demand. Under such conditions, we believe that it would be prudent to advise the treatment plants to shut down immediately to mitigate potential contamination of the distribution system. AWWA welcomes the opportunity to explore these options further with the Agency and recommends leveraging the approaches outlined in ***Planning for an Emergency Water Supply***, a resource developed collaboratively with the National Homeland Security Research Center.

5. ***From the section "Wait for Flow-By" - During this time, the system's existing storage capacity can be depended upon. If the stored water supplies could be depleted before the affected valves can be reopened, treatment of the contaminated water while using available stored water supplies should be considered. This assumes that the treatment technology will be in place or readily accessible.*** (3.5.3. Corrective Actions to Reduce Levels of Contamination, page 44)

The Agency's assumption is unreasonable, particularly within a large water system. Depending upon the radionuclide of concern, the only treatment options may be membrane filtration or ion exchange. Given the volume of water in some utilities, it should be noted that currently the largest mobile treatment system is a 1 MGD low –pressure membrane filtration unit. That is likely to be inadequate to handle the demand in a larger system. Moreover, such units create questions about the ability to directly pressurize the distribution system.

6. ***From the section "Establish Pipeline Connections to Closest Sources/Systems" - Running a pipeline from a "clean" water supply system to various distribution centers located throughout the affected community is a routine means of providing clean water.*** (3.5.3. Corrective Actions to Reduce Levels of Contamination, page 44)

AWWA collaborated with EPA-NHSRC to develop ***Planning for an Emergency Water Supply*** to address the options and factors that must be considered under emergency circumstances. This option as proposed assumes that a clean source of supply exists, which runs counter to EPA's own analysis as performed by the Environmental Assessment Division of Argonne National Laboratory. The Argonne analysis examines some of the likely impacts on water and wastewater operations. A similar analysis was also performed by the Department of Homeland Security (Porco, 2010).[2] The suggestion also presumes that the impacted community has not self-evacuated or been mandated to evacuate, which significantly alters demand. It should also be noted that running a pipeline to an affected area as suggested will require engineering expertise to select the route, the labor force and equipment to run the line, and likely, a hydraulic model to determine if the pipeline can be effective. These resources may not be available under emergency conditions.

[2] Porco, J.W. (2010). Municipal water distribution system security study: recommendations for science and technology investments, *Journal - American Water Works Association*, *102*(4): 30-32.

7. ***"However, the Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, an intermediate phase emergency drinking water PAG is being sought during the public review of this Manual."*** (3.5. Protective Action Guidance for Food and Drinking Water, page 42)

AWWA collaborated with EPA-NHSRC to develop ***Planning for an Emergency Water Supply*** to address the options and factors that must be considered under such circumstances. In addition, we would advise EPA to work with CDC and FEMA (www.READY.gov) to ensure messaging is consistent among various federal authorities from whom the public is likely to seek information following such an incident. AWWA has worked also with CDC and EPA to develop the ***Drinking Water Advisory Communication Toolbox*** which should also be considered as another resource to be leveraged.

AWWA believes a meeting with EPA staff to examine this issue in further detail would be beneficial. Please do not hesitate to contact me or Dr. Kevin Morley, kmorley@awwa.org, if you have questions about these comments.

Sincerely,

Tom Curtis
Deputy Executive Director
American Water Works Association

cc: Peter Grevatt, OGWDW
David Travers, OGWDW/WSD

Association of State and Territorial
ASTSWMO
Solid Waste Management Officials

444 North Capitol Street, N.W., Suite 315
Washington, D.C. 20001
tel: (202) 624-5828 fax: (202) 624-7875
www.astswmo.org

September 13, 2013

Air and Radiation Docket and Information Center
U.S. Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Ave., NW
Washington, DC 20460

Re: Docket ID No. EPA-HQ-OAR-2007-0268
Updates to Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents

Dear Madam/Sir:

The Association of State and Territorial Solid Waste Management Officials (ASTSWMO) Radiation Focus Group is providing the enclosed comments to the revised 2013 PAG Manual – Protective Action Guides and Planning Guidance for Radiological Incidents. ASTSWMO is an association representing waste management and remediation programs of the 50 States, five Territories and the District of Columbia (States). Our membership includes State waste program experts in the management and regulation of solid wastes. The enclosed comments reflect only the individual comments of the Radiation Focus Group's members and have not been reviewed or adopted by the ASTSWMO Board of Directors or other ASTSWMO Program Subcommittees. In addition, individual State or Territorial waste programs may also provide comments based on their own State perspectives and experiences.

Should you have any questions or require additional information, please contact me at (303) 692-3403.

Sincerely,

For

Jennifer Opila (CO)
Chair, ASTSWMO Radiation Focus Group

cc: ASTSWMO Radiation Focus Group
Dan Schultheisz, U.S. EPA ORIA

QUESTION 1	**To implement the PAGs, the reader is referred to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals. The Assessment Manuals are updated with current International Commission on Radiological Protection (ICRP) dosimetry models (i.e., ICRP 60 series) and dose coefficients. The FRPCC also encourages the use of computational tools such as DOE's Turbo FRMAC, RESRAD RDD and NRC's RASCAL or other appropriate tools and methods to implement the PAGs. We request comment on the usefulness of this approach and seek feedback on how to facilitate implementation of these methods in emergency management plans.**
	COMMENTS: • TURBO FRMAC and subsequent training opportunities should be more easily available (the software is expensive). • Expanding training opportunities for RESRAD RDD and NRC RASCAL specifically for response organizations is recommended, as CAMEO is periodically made available to response organizations. • Currently RESRAD appears to be offered as a suite, with training including multiple RESRAD models, not just RESRAD RDD as for the purpose of RDD or IND plume assessments. Taking the whole suite of RESRAD training is quite time consuming. RESRAD RDD could be offered separately via web training. • The deletion of the EPA-400 era Dose Conversion Factor (DCF) tables, which provided adequate detail and guidance for State and local programs to perform the computations, forces the reliance on FRMAC and RASCAL modeling particularly for intermediate phase dose assessment. The methods used by FRMAC and RASCAL to calculate DCF's have become very complex unlike the former EPA-400 tables that showed DCF's for ground deposition and re-suspension along with clear explanations of their methodology, making it relatively simple for entities to develop their own computational methods using, for example, Excel. Entities (States) will have to invest considerable resources for personnel to learn (most probably Turbo FRMAC) a complex and cumbersome program, at the expense of in-house development and training. In a real event, States may not be able to conduct extensive intermediate (second) phase dose assessment but instead may be limited to their initial assessment, waiting for FRMAC to provide the more extensive assessments. • EPA has chosen to recommend the use of computational tools such as Turbo FRMAC and RASCAL to calculate values to be compared to the PAGs. While in basic agreement with this concept, it should be

ED_001057_00026684

	made clear that there may be a slight difference in results depending on which model is used.
QUESTION 2	**The Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, a drinking water PAG is being sought.**
	COMMENTS: • Yes, such guidance is appropriate for inclusion in the PAGs. • In the early phase of the event, EPA MCLs (list of Drinking Water Standards and MCLs table – National Primary Drinking Water Regulations - as suggested in section 3.5 of this document http://water.epa.gov/drink/contaminants/index.cfm#List) should be used when possible. • In *extreme* circumstances only, with the exception of uranium (kidney toxicity), alpha emitters (quality factor 20 - internal hazard), and the radium series, dose assessments could be calculated that would correspond with the dose deemed acceptable for the event by the technical working groups. This information would be communicated by decision makers or their designated public information officers. • Water not meeting drinking water standards should be used for non-ingestion purposes only, such as bathing and cleaning items. • During the intermediate and late phases of an event, safe water should be supplied to the populace for drinking whenever possible. • The threshold for a water standard, especially for the first year, may be too stringent at 4 mRem/yr. FDA limits CDE to 5 rem and an EDE of 500 mrem. Not all the principle radionuclides cited by FDA will have lasting effects on exposure. Chernobyl showed that months after the initial depositions, rivers and reservoirs were generally below guideline limits for safe drinking water. Groundwater was not severely affected because long-lived isotopes were absorbed to surface soils. • The short term emergency drinking water guide may be useful to protect the public, but according to the study conducted by World Health Organization (WHO, 2012), the possibility of getting radionuclides released from a nuclear power plant accident to the tap water is very low. The study assessed only the

ED_001057_00026684

	ingestion of radionuclides through drinking water, and the estimation of radiation dose from the ingestion of tap water has been made based on measured activity concentrations. The study concluded that the dose from ingestion of radionuclides through drinking water from tap is low compare to the dose from other exposure pathways (WHO, 2012). According to this study, the highest effective doses were estimated to be less than 0.1 mSv (10mrem) and the highest thyroid doses were estimated to be at most about 2 mSv (200mrem). In both cases the maximum dose was estimated to be for 6-month-old infants fed on formula milk prepared using tap water. According to this study for tap water, it is not relevant to put PAGs for tap drinking water provided that only tap water is used for drinking. Reference: World Health Organization (2012). Preliminary dose estimation from the nuclear accident after the 2011 Great East Japan earthquake and tsunami. Retrieved from http://whqlibdoc.who.int/publications/2012/9789241503662_eng.pdf • We agree that the final version of the PAG manual should have some guidance for drinking water situations where the event may affect the drinking water supply to an extent the supply is the only water available. During the intermediate phase, a drinking water PAG should be developed using stakeholder input and optimization. It should be an all pathways approach, taking into account the dose received from external exposure and ingestion. What are needed are simple equations (or spreadsheet) that can be used to determine dose, given analytical results of nuclides as input, with EPA-determined intake parameters. This would give the States the tools necessary for a consistent approach for assessing the dose from drinking water. For each nuclide, only the dose conversion factor for the critical group should be used, thereby ensuring that the most vulnerable populations are protected. • There is no information provided as to how to address private wells. EPA should provide rules of thumb for how fast contamination would get into groundwater given certain depths to groundwater and soil type. This is a complicated issue and depends on many factors besides depth; however, a worst case scenario could be modeled for the major soil types.

ED_001057_00026684

Chapter 2 – Early Phase:	
QUESTION 3	**The most substantive PAG change in the Early Phase is the 2001 guidance from the FDA that lowers the threshold for administration of potassium iodide (KI) to the public from 25 rem projected adult thyroid dose to 5 rem projected child thyroid dose. Chapter 2 includes a streamlined implementation scheme based on FDA's guidance. Please comment on the usefulness of this simplified guidance in the text of Chapter 2.**
	COMMENTS: • A highly visible section should be added that specifies the potential hazards associated with taking KI (i.e., allergic reactions). This section should be located in close proximity to the guidance table, so that those persons making the decision to take KI are clearly aware of the hazards. • A reduction from 25 Rem to 5 Rem for administration of KI to the public is appropriate. • This is the most conservative protection approach. It uses the thyroid dose limit of the most sensitive age group of the population (child) as the PAG level to administer the KI to the general target population. It helps to avoid the possible thyroid risk of children from exposure. Thus, it is a good recommendation. • Some States do NOT recommend KI to the public. Therefore, we agree with listing KI as a supplemental protective action.
QUESTION 4	**The skin and thyroid evacuation thresholds were removed to avoid confusion with the KI threshold. The skin and thyroid doses were 5 and 50 times higher, respectively, than the 1 to 5 rem whole-body dose guideline. Please comment specifically on the appropriateness of not retaining the skin and thyroid evacuation thresholds.**
	COMMENTS: • This was an appropriate step to avoid confusion, given the potential for misunderstandings when non-radiation professionals may be using the document for guidance. • The removal of skin and thyroid evacuation threshold limits is appropriate and simplifies the decision-making process. • Thyroid and skin are peculiar organs that need protection measures before they are seriously affected by the radiation. The thyroid may be affected seriously due to the releases of Iodine from the incident. Of

ED_001057_00026684

	course, this problem may be solved by administrating KI without evacuation if the release would not stay for a long time but the skin may be exposed continuously due to the deposition of beta and gamma emitters' radionuclide on the clothes and skin, particularly with low energy beta and gamma energy radionuclides. This means there might be a possibility that the skin that would absorb a radiation which is greater than the dose limit for the skin before the whole body dose reaches to the minimum of 1rem. How is it justified to waive the 1992 PAG for the skin and thyroid evacuation thresholds? This justification does not appear to be in the manual. • States may wish to continue to use a Thyroid PAG as they do not currently issue KI to the public. Therefore, we recommend including language in the document that States may continue to use a Thyroid PAG for evacuation or shelter if they wish to add this additional PAG to ensure the public health and safety is protected in all possible scenarios.
Chapter 3 – Intermediate Phase	
QUESTION 5	**The most substantive PAG change in the Intermediate Phase is the removal of the 5 rem over 50 years relocation PAG which was potentially being confused with long term cleanup. Please comment on the appropriateness of this change.**
	COMMENTS: • This change was appropriate for clarification purposes. 50 years could easily be mistaken to suggest a lifetime dose. • The 50 year relocation PAG was unrealistic given decay, weathering, changing population demographics and multiple other considerations. Its elimination is appropriate. • 5 rem over 50 years is very low compared to the current proposal, which is greater than 2mrem in the first year, 0.5 rem /year in the second and subsequent years. The previous PAG for relocation is more conservative than the current proposed one. The reason (justification) for changing the previous PAG for relocation is not clearly in the manual. It might be good to show the reason for this change in the manual. As it is stated in the question, the change is to avoid confusion with the long term cleanup guide but it might be clearer to show this change from radiation risk perspectives. • The new draft guide also recommends taking simple dose reduction techniques if the projected dose is

ED_001057_00026684

	below 2rem (20 mSv). It is not clear to what extent the dose reduction techniques would be implemented. It may be clear if the simple dose reduction techniques are implemented until attaining a regulatory site release criteria, which is 25mrem/year. 25mrem/year is the NRC site release criteria. The purpose of the dose reduction techniques is to remove radionuclide contaminants released due to the incident and this in turn reduces the radiation dose rate to the acceptable limit of the public. • Removal of the long term PAG of 5 Rem is appropriate. Consideration out to 50 years should be part of the late phase/clean up criteria, not part of an intermediate phase PAG.
QUESTION 6	**As an extension of the PAGs, new guidance on reentry to relocation areas is provided to inform plans and procedures to protect workers and members of the public as the Intermediate Phase progresses. Please comment on the format and utility of this material.**
	COMMENTS: • The re-entry matrix will be especially useful for non-radiation professionals who have limited expertise in radiological issues, and are tasked with making decisions for re-entry. • The explanations provided are very helpful in adding details on issues such as waste minimization (pave, seal, or remove roadways), and decisions to demolish or decontaminate buildings, balanced with the difficulty of disposing of large volumes of radioactive waste. • The concept of limited re-entry (stay time) for specific tasks to minimize dose provides very useful information to both decision makers and the affected public. • Guidance on re-entry to protect workers and the public as the Intermediate Phase progresses is appropriate as long as the guidance remains generic (strategic) as opposed to tactical and States are afforded the flexibility to modify re-entry instructions with regard to event specifics. • Additional guidance on re-entry is beneficial.

ED_001057_00026684

QUESTION 7	**Please comment on whether it would be useful to develop a new, combined Intermediate Phase PAG considering all exposure pathways to potentially simplify decision making.**
	COMMENTS: • Such a document or section of the PAG would be very useful. Expansion on the discussion of processes to make the best use of existing assets during the intermediate incident phase while minimizing dose to the public would be recommended. • A selection of likely scenarios illustrating potential contamination events, along with associated dose projections, and recommendations for working (stay time) scenarios with associated dose projections, could be provided as examples. • The "stay time" concept is key to in-depth discussions on how best to utilize compromised assets, such as water and critical infrastructure systems, while decontaminating and reactivating those assets. • It would be premature to recommend development and institution of a new, combined Intermediate Phase PAG to potentially simplify decision-making; rather, assessing and evaluating the feasibility should first be considered. • We agree with the keeping the relocation PAG separate from the food PAG because the required actions to implement are so different (moving people vs. embargoing food products).
Chapter 4 – Late Phase	
QUESTION 8	**A brief planning guidance on the cleanup process is included. Please comment on the usefulness of this information, as well as how it might best be implemented in State, tribal and local plans. It should be noted that the extent and scope of contamination as a result of a NPP, RDD or IND incident may be at a much larger scale than a site or facility decommissioning or remedial cleanup normally experienced under established regulatory frameworks. Lesser radiological incidents may be well addressed under existing emergency response and environmental cleanup programs.**
	COMMENTS: • The discussion is beyond what would be needed by most local (and some State) decision makers, but it is very useful information for those who need to know what is involved in the process. The factors affecting

ED_001057_00026684

	feasibility, and ways to minimize waste while controlling dose, are good for planners and for the development of technical working groups. • Crucial to local and State decision makers, however, is the guidance providing information that the decision makers and the public will need to process, such as potential effects on overall community health, communication of risks, separation from home, and other stress factors on the population. • The information lays a good framework for people who will be making important decisions on behalf of the affected population and choosing paths forward after an incident. • This is quite limited in scope and the applicability narrow. More detailed guidance on clean-up and radioactive waste disposal would be appropriate. • This material might be better suited for an appendix. By making the guidance more of a checklist format it may also be more useful.
QUESTION 9	**A suggested process and organization for approaching the late phase cleanup is provided from the 2008 RDD-IND Planning Guidance. Please comment on the merging of that guidance with the 2013 PAG Manual.**
	COMMENTS: • Very helpful. The inclusion of the IND and RDD material is crucial to making the document stand alone. • Putting this information into the document is extremely applicable, as the NPP, IND, and RDD responses and paths forward overlap significantly. The information is pertinent to the goals of the report. • IND and RDD planning remains in its infancy; new tactics and countermeasures are constantly being introduced. Merging the 2008 RDD-IND Planning Guidance document and evaluating users against those metrics, rather than citing available references like NCRP, CDC, DHS and other guidance, may be inappropriate. • The new EPA PAG Manual needs more definitive guidance for State planners on how to implement the cleanup process. It is imperative that there be some standards established ahead of time that States can reference.

ED_001057_00026684

QUESTION 10	**Basic planning guidance on approaching radioactive waste disposal is included. Please comment on this material and how it should be implemented in emergency response and recovery plans at all levels of government.**
	COMMENTS: • The information is very good for State and federal decision makers, but is more information than local leaders may need, unless they are in an area affected or potentially affected by a disposal site. • It is suggested that this information being in an appendix to the main document. • This is quite limited in scope and the applicability narrow. More detailed guidance on clean-up and radioactive waste disposal would be appropriate. • The planning guidance states that the waste issue is a State issue. There are numerous scenarios where that would not be the case (e.g., terrorist attack). A large release could lead to low level waste volumes that are impossible to store realistically. Standards need to be developed that ensure that the amount of low level waste generated can be accommodated at existing low level waste storage facilities. States are looking for realistic solutions.

ED_001057_00026684

ADDITIONAL COMMENTS	• Strongly suggest adding an appendix devoted entirely to the needs of public information officers. • In the event of an IND or RDD, public understanding of why the decision makers are making specific, sometimes difficult, decisions will be imperative to acceptance of the measures decided upon. • Suggest including the links (below) in the appendix to the recently released FEMA guidance documents for pubic communication after an IND or NPP event: IND: https://s3-us-gov-west-1.amazonaws.com/dam-production/uploads/20130726-1919-25045-0618/communicating_in_the_immediate_aftermath__final_june_2013_508_ok.pdf NPP: https://s3-us-gov-west-1.amazonaws.com/dam-production/uploads/20130726-1919-25045-1433/communicating_during_and_after__npp_incident__june_2013__secure_.pdf • Section 2.7, CONTAMINATION LIMITS AND MONITORING OF THE ENVIRONMENT AND POPULATIONS, should include a reference to an appropriate resource for more detailed information and guidance, especially regarding community reception centers, monitoring, decontamination and medical evaluation. • Overall, an excellent document.

ED_001057_00026684

IEMA
Illinois Emergency Management Agency

Jonathon E. Monken, Director
Joseph Klinger, Assistant Director

September 13, 2013

Air and Radiation Docket and Information Center
Environmental protection Agency
Mail Code 6102 T
1200 Pennsylvania Ave NW
Washington DC 20460

Subject: Docket ID No EPA-EPA-HQ-OAR-2007-0268

To Whom It May Concern:

IEMA believes the efforts of the EPA to revise the current PAG Manual are a positive step. To the extent possible, IEMA has attempted to provide comments on the specific issues that were requested in Section E of the Federal Register Notice. However, we have some generic comments that apply to the entire document that we feel should be addressed before this new manual is considered final.

The title of the PAG Manual is "Protective Action Guides and Planning Guidance for Radiological Incidents". The first three chapters are clearly focused on the basis for the PAGS, the numerical values for projected dose comparison, and the actions that should occur. The fourth chapter focuses more on planning guidance and does not include much in the way of PAGs. Therefore, we feel that the title of the fourth chapter should be changed to "Planning Guidance for the Late Phase" instead of "Guidance for the Late Phase".

IEMA feels that referencing the 1992 version of the PAG manual is detrimental to the purpose of the new manual and could lead to much confusion. When the new version of the manual becomes final, it should completely replace the old version. IEMA feels that the sections of the old PAG manual that are still applicable should be contained in the new PAG manual. The 1992 version of the PAG manual was a standalone document that new users could use to completely understand the PAGs. Inclusion of that material in the new version would enhance the usability of the document.

EMAP Accredited

1035 Outer Park Drive • Springfield, Illinois • 62704 • Telephone (217) 785-9900 • http://www.iema.illinois.gov

Printed by the authority of the State of Illinois on Recycled Paper

Thank you for considering these comments and requests. The IEMA stands ready to assist our Federal partners and are available to provide additional details on any of these issues should you desire. I look forward to your response.

Sincerely,

Joseph Klinger
Assistant Director

1035 Outer Park Drive • Springfield, Illinois • 62704 • Telephone (217) 785-9900 • http://www.iema.illinois.gov

Printed by the authority of the State of Illinois on Recycled Paper

SPECIFIC COMMENTS ON PROPOSED EPA Manual of Protective Action Guides

1. **To implement the PAGs, the reader is referred to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals. The Assessment Manuals are updated with current International Commission on Radiological Protection (ICRP) dosimetry models (i.e., ICRP 60 series) and dose coefficients. The FRPCC also encourages the use of computational tools such as DOE's Turbo FRMAC, RESRAD RDD and NRC's RASCAL or other appropriate tools and methods to implement the PAGs. We request comment on the usefulness of this approach and seek feedback on how to facilitate implementation of these methods in emergency management plans.**

   IEMA understands why EPA has chosen to recommend the use of computational tools such as Turbo FRMAC and RASCAL to calculate values to be compared to the PAGs. While in basic agreement with this concept, it should be made clear that there may be a slight difference in results depending on which model is used.

2. **The Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, a drinking water PAG is being sought.**

   This version of the PAG manual references values as low as 4 mrem/year (NPDWR and SWDA) and as high as 10 rem/year (IAEA). IEMA believes that 4 mrem/year is not appropriate because it is intended for non-emergency situations and does not reflect the intent of the DHS RDD/IND PAGs. IEMA believes that the IAEA value is also not appropriate because it is too high. IEMA believes that water should be treated like any other food type. If one child is drinking milk and another child is drinking water, then the limiting concentrations should be identical. IEMA recommends that the drinking water PAG should be 500 mrem effective or 5000 mrem organ.

3. **The most substantive PAG change in the Early Phase is the 2001 guidance from the FDA that lowers the threshold for administration of potassium iodide (KI) to the public from 25 rem projected adult thyroid dose to 5 rem projected child thyroid dose. Chapter 2 includes a streamlined implementation scheme based on FDA's guidance. Please comment on the usefulness of this simplified guidance in the text of Chapter 2.**

   Much of this section discusses the various effects of radioiodine on the different age groups. Although we are not disputing this fact, the way it is presented appears

contradictory and confusing. It would be much simpler to state that the effects of radioiodine will vary among the different populations, but for practical reasons, it is recommended that KI be administered at the lowest intervention threshold (> 5 rem projected thyroid internal exposure in children). Additionally, some states do NOT recommend KI to the public. Therefore, IEMA agrees with listing it as a supplemental action.

4. **The skin and thyroid evacuation thresholds were removed to avoid confusion with the KI threshold. The skin and thyroid doses were 5 and 50 times higher, respectively, than the 1 to 5 rem whole-body dose guideline. Please comment specifically on the appropriateness of not retaining the skin and thyroid evacuation thresholds.**

   IEMA feels that the removal of the thyroid evacuation threshold is inappropriate because it is contradictory. For example, if you run RASCAL using a containment reading, leak rate, and direct (unfiltered) release from the reactor building, the thyroid dose could be the controlling dose. The projected thyroid dose could be in excess of the PAG to recommend KI, but the TEDE dose would not be in excess of the evacuation PAG. Additionally, in many states, evacuation is the preferred protective action over issuance of KI. Therefore, IEMA recommends leaving the language to use a thyroid PAG threshold for evacuation or shelter.

5. **The most substantive PAG change in the Intermediate Phase is the removal of the 5 rem over 50 years relocation PAG which was potentially being confused with long term cleanup. Please comment on the appropriateness of this change.**

   IEMA feels that the removal of the long term PAG of 5 Rem is appropriate. Consideration out to 50 years should be part of the late phase/clean up criteria, not part of an intermediate phase PAG.

6. **As an extension of the PAGs, new guidance on reentry to relocation areas is provided to inform plans and procedures to protect workers and members of the public as the Intermediate Phase progresses. Please comment on the format and utility of this material**.

   IEMA feels that additional guidance on reentry is beneficial. However, the current format and content could be enhanced. Currently, IEMA has procedures that provide additional guidance on reentry. Not only does this guidance include a total that the individual should not exceed, but it also provides guidelines on exposure rates, plant conditions, and environmental conditions that should be considered before authorizing permission for reentry.

7. **Please comment on whether it would be useful to develop a new, combined Intermediate Phase PAG considering all exposure pathways to potentially simplify decision making**.

   IEMA agrees with keeping the relocation PAG separate from the food PAG because the required actions to implement are so different (moving people vs. embargoing food products).

8. **A brief planning guidance on the cleanup process is included. Please comment on the usefulness of this information, as well as how it might best be implemented in state, tribal and local plans**

   Although IEMA applauds the USEPA for creating a structure that incorporates all the stakeholders involved, we find Chapter 4 – Guidance for Late Phase to be a very simplistic overview of the cleanup/decommissioning process and is lacking in both guidance and technical merit. Thus, this creates concerns about its use and effectiveness as a decision making aid. As stated in Section 1.1, "this Manual provides recommended numerical protective action guides (PAGs) for the principal protective actions available to public officials during a radiological incident", the purpose of the PAG is to provide stakeholders with a decision making tool to aid them in protecting the public and environment from unwarranted doses of radiation during and after an event. Since cleanup activities would take years to complete and the fact that a PAG level is not to be used in the long term, IEMA suggest that the cleanup guidance put forth in this document be removed and a standalone cleanup/decommissioning guidance document be created much like *NUREG 1757 Consolidated Decommissioning Guidance*. The new guidance would then be the platform for stakeholders to make informed decisions. This would also mean that the Late Phase would primarily consist of characterization of the resultant contamination. That data would then be used for a risk-informed regulatory approach to the cleanup.

9. **A suggested process and organization for approaching the late phase cleanup is provided from the 2008 RDD-IND Planning Guidance. Please comment on the merging of that guidance with the 2013 PAG Manual**.

   IEMA agrees that merging the 2008 RDD-IND Planning Guidance with the 2013 PAG Manual is appropriate.

10. **Basic planning guidance on approaching radioactive waste disposal is included. Please comment on this material and how it should be implemented in emergency response and recovery plans at all levels of government.**

As discussed in the PAG Manual, the volume of waste resulting from an incident at a nuclear power plant or an RDD/IND event could overwhelm the existing LLRW disposal capacity and there are limitations to using DOE facilities for the disposal of non-DOE waste. The USEPA assumes that RCRA Subtitle D and C landfills could be a viable disposal option for waste generated from a like event but again, there are hurdles that need to be cleared before landfills are able to accept this waste form. Because of all the existing problems with disposal of waste that would be generated from a large scale radiological event, IEMA asks that the USEPA and the federal government work with the states and be proactive rather than reactive in solving these issues. Part of those discussions would be to determine who is responsible for paying for waste disposal. The USEPA states in the manual that the financial burden lies with the state in which the event occurs. If the event is NPP accident, a revenue stream is in place but if the event is a RDD/IND then this becomes a national security issue, which would be a federal government responsibility.

Sunday, September 15, 2013

Subject: Withdraw Proposed Protective Action Guidelines because they fail to protect the public health -- Protective Action Guides Manual; Updates: Protective Action Guides and Planning Guidance for Radiological Incidents (Document ID EPA-HQ-OAR-2007-0268-0001)

Dear EPA Administrator McCarthy,

I am writing to you today to express my strong opposition to the proposed Protective Action Guidelines (PAGs) for radiation releases because they fail to protect the public health. I demand that the Environmental Protection Agency (EPA) withdraw the PAGs it released on April 15, 2013 for the following reasons:

- The EPA relies on advice from nuclear industry funded organizations, like the National Council on Radiation Protection and Measurements (NCRP), to help establish radiation exposure levels for the public. This is an obvious conflict of interest.

- The EPA PAGs fail to incorporate the lessons of nuclear catastrophes, like Chernobyl and Fukushima (which is now dumping hundreds of tons of radioactive water a day into the Pacific), by ignoring increasing and migrating contamination.

- The EPA fails to incorporate key applicable recommendations of the United Nations Human Right to Health report, recently released, on the Fukushima disaster.

- The PAGs fail to protect the public by using blanket guidelines for all radioactive releases.

- The PAGs fail to require the EPA to work with other agencies to ensure the public is fully informed of, and protected from, man-made radiation in food.

- The EPA fails to fully account for any longer term chronic exposure sources like contaminated food.

- The PAGs fail to protect the public by raising the radiation standards for drinking water to well above Safe Drinking Water Act limits.

- The PAGs fail to protect the public by establishing poor long-term cleanup standards.

- The PAGs fail to protect the public by establishing new allowances to permit disposal of radioactive waste in unlicensed sites.

- Allowing 1 in 6 people to get cancer from radiation exposure in order to protect nuclear industry profits works against the EPA's mission to "protect human health

and the environment." The EPA needs to make health the driver of cleanup and recovery, not industry economics.

> *"It is horrifying that we have to fight our own government to save the environment."*
> *-- Ansel Adams*

I ask that you do the following:

- Do not set a precedent for unsafe disposal of nuclear waste in these guidelines, by allowing disposal in unlicensed sites.
- Maintain or strengthen the drinking water standards rather than roll them back.
- Keep, or make more protective, the action levels for doses to the thyroid and the skin that are already in place.
- Remove the automatic acceptance of very high food and water contamination levels (higher than being used in Japan after Fukushima).

> *"Do not suffer your good nature, when application is made, to say 'Yes' when you should say 'No'. Remember, it is a public not a private cause that is to be injured or benefited by your choice."*
> *-- George Washington*

In the wake of the Fukushima accident, the US government should be doing more to protect public health and safety, not less. I demand the PAGs be withdrawn, rather than adjusted or amended, because of the EPA's connection to the NCRP, an industry-funded entity sponsored and supported by the EPA to advise them on these guides. This collaboration with NCRP is a conflict that will make creating independent, protective radiation standards extremely difficult. Please do not let the interest of a quick cleanup supersede your responsibility to protect public health and safety.

> *"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."*
> *-- Aldo Leopold*

Thank you for your consideration of my comments. Please do NOT add my name to your mailing list. I will learn about future developments on this issue from other sources.

Sincerely,
Christopher Lish
Olema, CA

MessageID: <3E02263887F34348AF74BA9432AE4F186CD476BE@UM-MBX-N01.um.umsystem.edu>
From: "Eerkens, Jozef W." <EerkensJ@missouri.edu>
Sent: 07/10/2013 06:18:30 PM
Subject: Docket ID No. EPA-HQ-OAR-2007-0268

Body: 7/10/13

I strongly applaud EPA's action to return to science-based radiation safety regulations. In a modern society we cannot have rules based on phantasies and unfounded fears that many anti-nuclear techno-phobes try to iinfuse into the public. As a nuclear engineering professional for 50 years who has carefully followed all nuclear-related issues, I am satisfied that nuclear power can be and is generated extremely safely in the USA and (now) also globally.

Safe clean nuclear power is a gift of providence and essential to allow mankind to overcome the crisis it faces by mid-century when oil and gas fields will become depleted. Our children and grand-children will need a lot of it. Nuclear fission energy can provide (for 5000 years) all "big mama" source energy required for making synfuels and electricity that keeps modern society going. As a bonus it will also ameliorate global warming and air pollution since it does not dump anything into the atmosphere. Fickle wind and solar energy could never replace gas, oil, and coal (gone in 100 years) and compete with nuclear. It is too unreliable and dispersd. Even if we covered all of our scenic deserts and mountains with windmills and solar panels, it could never contribute more than 10% of all energy man needs, which includes manufacturing cars, ships, aircraft, bridges, etc, etc., energy consumptions that are often overlooked.

Some hysterical uninformed anti-nuclear groups (however well-meaning) want to ban all nuclear power and demand that safe radiation levels be set below what everyone of us is already exposed to by nature (K-40, cosmic rdiation, etc). The human body has evolved succesfully under this radiation level and might even have benefitted (hormesis) from it. Such anti-nuclear groups are unaware that their actions, if carried out, would ultimately cause the collapse of our modern world, the same goal of Al Qaida and other nihilist terrorrists.

Please stand firm against attacks by anti-nuclear groups who want you to maintain or increase unrealistic MPD (= maximum permissable dose) radiation levels that are scientifically senseless. They will only unnecessarily increase the cost of providing more badly needed nuclear energy to the world.

Jeff W. Eerkens, PhD-NE, UC-Berkeley, 1960

MessageID:
<14504_1373494995_51DDDED2_14504_6719_1_9B44A9B612B803468CFAC905E1161E381F487A0E@USCLTEXMB01.epri.com>
From: "Rogers, Lee" <lrogers@epri.com>
Sent: 07/10/2013 06:22:41 PM
Subject: Docket ID No. EPA-HQ-OAR-2007-0268

Body: Every U.S. nuclear power plant has a detailed plan for responding in the event of an emergency to protect public health and safety. Plant personnel test the plans regularly with the participation of local and state emergency response organizations.
EPA's guidance represents an extensive and well-researched effort. The agency has arrived at a sound approach to achieve a necessary recovery from extremely unlikely emergency events.
Importantly, the EPA's proposed guidance does not seek to change existing standards on radiations levels that are considered safe—either with cleanup standards or allowable exposure. Radiation exposure targets in the guidance are limits at completion of cleanup activities.
The draft guidance incorporates lessons learned from Fukushima, updates the scientific bases for decision-making, and affords emergency personnel, policymakers and the public flexibility to balance radiation health risks with other factors to ensure that protective actions "result in more benefit than harm," according to the guidance notice. Another positive aspect is that it provides guidance for radiological events regardless of the cause.

LAR Electronic Signature 3

Lee Rogers

Senior Project Manager

Nuclear Plant Technology

772-288-4369

lrogers@epri.com

Together...Shaping the Future of Electricity

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
OFFICE OF RADIATION PROTECTION
111 Israel Road SE • PO Box 47827 • Olympia, Washington 98504-7827
TDD Relay Services: 1-800-833-6388

September 10, 2013

Air and Radiation Docket Information Center
Environmental Protection Agency
ATTN: Docket ID No. EPA-HQ-OAR2008-0268
Mail Code: 6102T
1200 Pennsylvania Avenue NW
Washington, DC 20460

Re: Request for Comments on Interim Guidance

The Washington State Department of Health, Office of Radiation Protection, appreciates the opportunity to review and comment on the updates to the Interim Use Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents, 78 Federal Register 22257, April 15, 2013.

Our Radiological Emergency Preparedness Section provided the initial review of this document. Their comments were submitted for review and evaluation to our Environmental Sciences Section and our Office of Drinking Water. The final comments are enclosed.

If you have questions, please contact Mark Henry at mark.henry@doh.wa.gov or (360) 236-3271.

Sincerely,

David B. Jansen, P.E., LEED AP
Director

Enclosure

COMMENTS
from the Washington State Department of Health
on the Environmental Protection Agency Interim Guidance
Docket ID No EPA-HQ-OAR2008-0268

1. **To implement the PAGs, the reader is referred to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals. The Assessment Manuals are updated with current International Commission on Radiological Protection (ICRP) dosimetry models (i.e., ICRP 60 series) and dose coefficients. The FRPCC also encourages the use of computational tools such as DOE's Turbo FRMAC, RESRAD RDD and NRC's RASCAL or other appropriate tools and methods to implement the PAGs. We request comment on the usefulness of this approach and seek feedback on how to facilitate implementation of these methods in emergency management plans.**

   We understand that all of these modeling programs are effective in performing needed calculations. Each program will produce somewhat different results based on the assumptions used in developing the programs. Each program has different strengths based upon its intended purpose and the differing needs of the user and type of event. The results provided by each of these programs will be useful even with the differences given the number of uncertainties in a radiological event.

   For example, during a commercial nuclear power plant event, NRC's RASCAL would be most useful during the very initial stages of the event. It should at that time be checked against Turbo FRMAC. At some point in the event, enough information will be received from outside of the plant environment that Turbo FRMAC would then become the primary tool with NRC's RASCAL being the check program. In the instance of an RDD, correlating runs should be performed using Turbo FRMAC for immediate protective actions while RESRAD RDD information would be used to look at intermediate and late phase protective actions. These two data sets can be compared for cross-checking accuracy and refining protective actions.

   In regard to basing the dosimetry models and coefficients of the ICRP recommendation, the ICRP provides the best science and statistics available and should be incorporated to bring local, state and federal programs in line with programs internationally. As evidenced during Fukushima, the releases from the Daiichi reactors were of international concern and caused actions to occur around the world to assure that effects to the public health were mitigated. In addition, events where international support is needed such as major nuclear power plant releases and improvised nuclear device detonation, basing guidance on international guidance brings each nation closer to planning and training to the same standards which can provide a marked increase in the efficiency of response support.

2. **The Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, a drinking water PAG is being sought.**

   <u>Page 9, Chapter 1, Section 1.4.3</u>
   The 5th paragraph on this page states that EPA is not proposing a specific, drinking water Derived Intervention Level (DIL) at this time. The manual refers to the existing standards under the Safe Drinking Water Act. The Safe Drinking Water Act limits are inappropriate for a one-

ED_001057_00026684

time accidental contamination involving radioactive materials, such as from a release at a nuclear power plant. The Safe Drinking Water Act limits are intended for use where the reference individual will be consuming the same water source at the same contaminant level for a period of 70 years. The EPA, in conjunction with the FDA, needs to publish useful emergency DILs for drinking water that are consistent with the FDA's guidance for food and milk. Our suggested values for the primary radionuclides would be found in Table 8.4 of NCRP 138. The NCRP 138 values are based on recommendations from the IAEA and the WHO. As an example of the incorrect applicability of the current SDWA limits, the State of Washington would have had to implement protective actions for I-131 in drinking water, when no health risk existed, following the Fukushima accident due to rain catchment systems exceeding the 3 pCi/L (0.0001 kBq/L) SDWA limit by at least 50 times. Suggested values are below in kBq/L (pCi/L).

Drinking water	kBq/L (pCi/L)
Cs-134, Cs-137, Ru-103, Ru-106, Sr-89	1 (27,000)
I-131, Sr-90	0.1 (2700)
Am-241, Pu-238, Pu-239, Pu-240, Pu-242	0.001 (27)

3. **The most substantive PAG change in the Early Phase is the 2001 guidance from the FDA that lowers the threshold for administration of potassium iodide (KI) to the public from 25 rem projected adult thyroid dose to 5 rem projected child thyroid dose. Chapter 2 includes a streamlined implementation scheme based on FDA's guidance. Please comment on the usefulness of this simplified guidance in the text of Chapter 2.**

   Pages 19-20, Chapter 2, Section 2.3.4
   We agree with recommending the administration of KI at a projected dose of 5 rem to the Thyroid. We currently recommend administration of KI at 5 rem Thyroid dose for our Emergency Workers.

4. **The skin and thyroid evacuation thresholds were removed to avoid confusion with the KI threshold. The skin and thyroid doses were 5 and 50 times higher, respectively, than the 1 to 5 rem whole-body dose guideline. Please comment specifically on the appropriateness of not retaining the skin and thyroid evacuation thresholds.**

   We agree with the decision to NOT retain the skin and thyroid evacuation thresholds.

5. **The most substantive PAG change in the Intermediate Phase is the removal of the 5 rem over 50 years relocation PAG which was potentially being confused with long term cleanup. Please comment on the appropriateness of this change.**

   We agree with the removal of the 5 rem over 50 years relocation PAG.

ED_001057_00026684

6. **As an extension of the PAGs, new guidance on reentry to relocation areas is provided to form plans and procedures to protect workers and members of the public as the Intermediate Phase progresses. Please comment on the format and utility of this material.**

   We support the use of the 2009 DOE guidance as a basis to expand plans and procedures for guiding re-entry into relocation areas. In fact, it is part of our State Radiological Response Plan for RDDs which is applicable to all radiological events. This plan is written as more of a guidance document for local plan development. There is a section we included that functions as an Emergency Operations Plan and provides contamination limits from the 2009 DOE guidance for re-entry activities. Specific details of re-entry activities should be detailed in local emergency management plans with oversight and support from state radiological subject matter experts.

7. **Please comment on whether it would be useful to develop a new, combined Intermediate Phase PAG considering all exposure pathways to potentially simplify decision making.**

   We believe that the relocation PAG should be kept separate from the food PAGs.

8. **A brief planning guidance on the cleanup process is included. Please comment on the usefulness of this information, as well as how it might best be implemented in state, tribal and local plans. It should be noted that the extent and scope of contamination as a result of an NPP, RDD or IND incident may be at a much larger scale than a site or facility decommissioning or remedial cleanup normally experienced under established regulatory frameworks. Lesser radiological incidents may be well addressed under existing emergency response and environmental cleanup programs.**

   The information is useful and should be included in the guidance. Implementation processes will be determined by the state, local, tribal, and NGO structure and process for each state. To facilitate each state's planning effort, a coordination workshop could be held annually at a venue such as the National Radiological Emergency Preparedness conference to share key areas of concern.

9. **A suggested process and organization for approaching the late phase cleanup is provided from the 2008 RDD-IND Planning Guidance. Please comment on the merging of that guidance with the 2013 PAG Manual.**

   We believe that it is more effective and efficient to align response planning and training for all types of radiological emergencies as much as possible.

ED_001057_00026684

10. **Basic planning guidance on approaching radioactive waste disposal is included. Please comment on this material and how it should be implemented in emergency response and recovery plans at all levels of government.**

    We do not see the waste generated from an Act of Terrorism as solely a State issue. An Act of Terrorism against the United States is a federal government issue and should be handled as such in coordination with state and local jurisdictions. To place this responsibility entirely on a state would bring about economic conditions that could possibly bankrupt state and local jurisdictions. In addition, radiological emergencies originating in nuclear power plants, department of defense facilities, and federal reservations are regulated by the federal government. Therefore, waste generated from releases of radioactive material from these events should be shouldered primarily by the responsible parties (i.e. owner/federal government) in coordination with state and local jurisdictions.

ADDITIONAL COMMENTS

1. **Page 5, chapter 1, section 1.4**

   The 2nd bullet (Intermediate Phase) states, "The period beginning after the source and releases have been brought under control (has not necessarily stopped but is no longer growing)..." is contradictory to the 1992 document where it states, "The intermediate phase is the period beginning after the source and releases have been brought under control and reliable environmental measurements are available for use as a basis for decisions on additional protective actions." It is also in conflict with the statement made in Section 3.1 of this manual which is consistent with the 1992 manual's statement. The parenthetical should be removed to provide accuracy and consistency. The Intermediate Phase cannot begin before the release terminates as it is impossible to characterize what has been deposited on the ground while material is still being released.

2. **Page 9, Chapter 1, Section1.4.3**

   The 3rd paragraph contains a NOTE which includes, "In some instances, however, where withdrawal of food and/or water from use would, in itself, create a health risk, relocation may be an appropriate alternative protective action. In this case, the ingestion dose should be considered along with the projected dose from deposited radionuclides via other pathways, for decisions on relocation." It is difficult to imagine a situation in the United States where a clean source for food and water would not be available, particularly in populated areas near nuclear power plants. This is not the Ukraine or Belarus where the people only have the crops they grow to provide them with food.

ED_001057_00026684

COMMENTS
from the Washington State Department of Health
on the Environmental Protection Agency Interim Guidance
Docket ID No EPA-HQ-OAR2008-0268

3. **Page 9, Chapter 1, Section 1.4.3**

   The first sentence in the 4th paragraph should be changed to read, "Keeping projected doses below the 0.5 Rem/yr (5 mSv/yr) PAG out for years - ...". These exposure values should indicate the applicable time frame.

4. **Page 15, Chapter 2, Section 2.3, Table 2-1**

   Footnote 'd' of the table states "Thyroid equivalent dose (see Section 2.3.5)"
   Section 2.3.5 is PAGs and Nuclear Facilities Emergency Planning Zones (EPZs) and has nothing to do with thyroid dose. This is probably a remnant from a previous revision. Section 2.3.4 is Considerations for Potassium Iodide (KI) and is probably where footnote 'd' should reference. We can find no mention of the words "Thyroid equivalent dose" in Section 2.3.4. The footnote should be revised to remove the word "equivalent" to conform to section 2.3.4.

5. **Page 21, Chapter 2, footnote10**

   We appreciate the comparison of the Naval Nuclear Propulsion Program (NNPP) reactors to commercial Nuclear Power Plants (NPP). There are three NNPP facilities in our state and we are frequently asked why the NNPP emergency planning zones are so small compared to a commercial NPP.

6. **Pages 26, 27, and 28, Chapter 2.6.2, Tables 2-2 and 2-3**

   Every effort should be made to avoid breaking tables over two pages. Splitting the table between the bottom of one page and the top of the subsequent page disrupts the ease of understanding of the tables. Tables and associated footnotes need to be kept as one.

7. **Page 36, Chapter 3.3, Table 3-1**

   Footnote "a" of the table references (see Section 3.7). Is this the correct reference?

8. **Page 41, Chapter 3, Section 3.4.2**

   The last paragraph of this section prompts the same comment as for Page 9, Chapter 1, Section1.4.3 regarding the withdrawal of food and drinking water.

9. **Page 42, Chapter 3, Section 3.5**

   The 2nd paragraph reiterates the statement about not proposing a specific drinking water PAG. We make the same comment here as was made for Page 9, Chapter 1, Section 1.4.3 requesting the establishment of an appropriate PAG for accidental contamination of drinking water.

ED_001057_00026684

September 16, 2013

The Honorable Gina McCarthy
Administrator
U.S. Environmental Protection Agency
Aricl Rios Building
1200 Pennsylvania Ave., N.W.
Washington, DC 20460
McCarthy.gina@Epa.gov

US EPA Air and Radiation Docket and Information Center
Mail Code: 6102T, 1200 Pennsylvania Ave NW, Washington, DC 20460
a-and-r-docket@epa.gov; www.regulations.gov

Re: Protective Action Guides for Radionuclides (Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Administrator McCarthy:

We write to express our concern about and opposition to key aspects of the revised Protective Action Guides (PAGs) for responding to releases of radioactivity. PAGs identify radiation doses that are to trigger actions to protect the public so as to avoid public exposures in excess of those doses. As such, the PAGs are critical for public protection; weak PAGs can significantly endanger the public.

On 15 April 2013 the Agency published in the *Federal Register* a request for public comment on the proposed PAG revisions; 78 FR 22257-60. Simultaneously, however, EPA made the new PAGs immediately effective, raising questions about whether the public comment opportunity is *pro forma* or serious.

Nonetheless, we respectfully submit this delineation of significant problems in the PAGs. Many of our organizations opposed efforts by EPA in the last days of the George W. Bush Administration to issue PAGs that would have substantially weakened radiation protections for the public by, for example, increasing dramatically the amount of radioactivity permitted in drinking water and in soil. We were gratified when the Obama Administration in its first days in office withdrew the Bush-era PAG proposal and promised a thorough review.

The current Obama PAGs now issued are in many respects as troubling as the Bush proposal, and in some particulars, even weaker in terms of public health protection. Some cosmetic changes have been made—e.g. vaguer language is used which may have the same disturbing effect. But at their core, rather than specifying protective actions to prevent public exposures, the PAGs would allow massive radiation exposures without any protective actions being recommended to limit them. We recommend the PAGs be withdrawn.

Our primary concerns are: (1) the proposal to allow, for one to several years after a release, radioactive contamination of drinking water at levels orders of magnitude above EPA's longstanding Safe Drinking Water Act (SDWA) limits, (2) language contemplating long-term cleanup standards vastly less protective than EPA's historically acceptable risk range, (3) the elimination of relocation PAGs for high thyroid and skin doses and for high projected cumulative whole body doses, (4) the recommendation to permit radioactive waste to be disposed of in unlicensed disposal sites, including regular municipal garbage dumps, (5) the inappropriate expansion of the PAGs to cover essentially all radioactive releases, from the most extraordinary (e.g. nuclear weapons explosions) to those far less consequential (e.g. transportation accidents involving relatively small amounts of radioactivity), (6) relying on PAG dose limits as high or higher than those in effect decades ago despite the fact that official estimates of cancer risks from radiation have increased significantly over that period, and (7) apparently un-reviewed retention of archaic and extremely high FDA food contamination guidelines.

Background

During the George W. Bush Administration, the Department of Homeland Security (DHS) issued PAGs for responding to the use by a terrorist group of an Improvised Nuclear Device (IND) or a "dirty bomb," a Radiological Dispersal Device (RDD). The DHS PAGs were very controversial. Many of us joined in critical comments.[1]

The DHS PAGs recommended not setting any standard for long-term cleanup but rather adopted a vague process called "optimization" in which the economic interest in not spending money on cleanup could outweigh the public health need to do so. No health-based standard would be established in advance in the PAGs, so decisions about how much to clean up would be made after the fact, selecting from various contradictory "benchmarks" from national or international advisory committees. Those entities are often heavily dominated by nuclear interests and have pressed for not requiring cleanup until doses reach extraordinary levels.

One of the benchmarks considered was *to not undertake cleanup* if the dose to the public were less than 1 rem (1000 mrem) per year (the equivalent of approximately 15,000 chest X-rays over thirty years) and *to only require cleanup over 10 rem per year* (roughly 150,000 chest X-rays over the same period), with discretion to not undertake cleanup when exposures are between those two doses.[2] According to the EPA's own current risk estimates per unit dose in its most recent "Blue Book,"[3] derived from the National Academy of Sciences' Report on the Biological

---

[1] See, e.g., group comment letter of 14 April 2006 and letters to then -EPA Administrator Leavitt of 2 December 2004 and 27 January 2005, attachments found , beginning at pg. 155, at http://committeetobridgethegap.org/wp -content/uploads/2013/04/080509LetterToEPAbr5.pdf and incorporated herein by reference.

[2] The adult dose from a PA (posterior-anterior or front) view chest X-ray is typically 2 millirem.

[3] *EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population,* EPA 402-R-11-001, April 2011. The Blue Book sets the excess cancer risk at an age - and sex-averaged value of 1.16×10^{-1} per Gray, with the first 30 years of life the risk being approximately 1.8 times higher. EPA standard practice when one doesn't consider lifetime exposure is to presume exposure over the first 30 years of life for residential scenarios and over the first 40 years for farmer scenarios.

ED_001057_00026684

Effects of Ionizing Radiation (BEIR VII), 1 rem per year over the first thirty years of life would result is an excess cancer in every 17th person exposed.[4] At 10 rem/year, EPA's own estimate is that one in every 1.7 people exposed would get a cancer from the radiation.[5] Allowing such high numbers of cancers to be produced from exposure to contamination would obviously be orders of magnitude beyond risks EPA has ever considered acceptable.

The DHS PAGs also recommended allowing radioactive contamination of drinking water at levels far higher than the SDWA allows.[6] Despite the substantial public opposition, the Bush Administration adopted the DHS PAGs.

Subsequent to the issuance of the DHS PAGs, EPA attempted to extend these weakened standards from terrorist events to non-terrorist events and indeed, to all radiological releases. In the EPA proposed PAGs, "optimization" was included for long-term cleanup and actual radionuclide concentrations were put forward for drinking water. Those drinking water levels were orders of magnitude higher than EPA's Safe Drinking Water Act. For some radionuclides, EPA was proposing to allow people to drink water contaminated to such a high level that drinking a single small glass would exceed a lifetime permitted consumption under the SDWA, according to internal EPA analyses obtained under the Freedom of Information Act. [7] Independent analyses confirmed this, showing that the proposed drinking water levels were, depending on the radionuclide, hundreds, thousands, tens of thousands, and hundreds of thousands of times higher than the SDWA limits.[8]

The EPA PAGs that the outgoing Bush Administration tried to publish in its last days in office also would have adopted the deeply troubling DHS "optimization" process for long-term cleanup. Furthermore, the applicability of the PAGs would have been extended to *all* radioactive releases.

Recognizing the highly problematic aspects of these proposals by the outgoing Administration, the Obama Administration withdrew them and promised a full and careful review. We were thus hopeful that when new PAGs were released, they would be truly protective. We have been deeply disappointed.

---

[4] 1 rem/year x 30 years x 2 x 10-3 cancers per rem during the first 30 years = 6 x 10 -2 cancers = 1 cancer per 17 people exposed.

[5] These are gender-averaged risk figures. Females are at even greater risk than males from the same levels of exposure meaning their risks are even higher than these estimates.

[6] The DHS PAGs recommended a high dose level for radiation from drinking water but did not provide specific concentrations for individual radionuclides .

[7] http://www.peer.org/news/news -releases/2010/04/05/radiation -exposure-debate-rages-inside-epa/

[8] See Hirsch and Marx, *Proposed Relaxation of EPA Drinking Water Standards for Radioactivity,* Committee to Bridge the Gap, October 2008, found as an attachment to the URL identified in footnote 1 above and incorporated herein by reference.

ED_001057_00026684

1. The PAGs Propose Allowing Radioactive Contamination of Drinking Water That Would Be Orders of Magnitude Higher than EPA's Longstanding Safe Drinking Water Act Limits

The Bush Administration PAGs presented a table of concentrations for specific radionuclides that it proposed would be allowed without requiring treatment or alternative water sources. These concentrations were grossly higher than the levels permitted under the SDWA. The furor they provoked contributed to the Obama Administration withdrawing the proposal.

However, rather than rejecting the Bush Administration approach, the new PAGs issued by EPA adopt a similar tack—proposing abandoning the SDWA requirements and replacing them with considerably higher values. But unlike the Bush PAGs, which expressly included a table of the extreme concentrations proposed for each radionuclide, the new PAGs bury the proposed alternatives in footnotes. (Footnotes 24-27 on p. 42). The actual values for the alternatives are not even included, only citations to other works. No comparison is provided whatsoever as to how much each of these proposed alternatives would weaken the protections in the SDWA.

We have thus undertaken that missing analysis. The results are striking and are summarized in the tables below. The first shows, for four key radionuclides, the EPA Safe Drinking Water Act limits (in becquerels per liter, bq/L) compared with the alternatives now proposed by EPA in the new PAGS, as well the values previously proposed by the Bush Administration. One sees the extraordinary weakening of protections EPA now proposes.

Obama Drinking Water PAG proposals vs. Existing EPA Safe Drinking Water Levels and Bush Administration PAG Proposal
units = Bq/L

Radionuclide	EPA Safe Drinking Water Act Maximum Contaminant Limit (MCL)	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water PAG Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	0.111	314	314	3000	170	10	300
Strontium-90	0.296	246	246	200	160	10	
Cesium-137	7.4	503	503	2000	1200	10	
Plutonium-239	0.555	27	27	50	2	1	

The second table shows how many times more radioactivity would be permitted in drinking water under the various alternatives compared to the SDWA limits. The extraordinary degree to which EPA proposes increasing permissible concentrations of radionuclides in drinking water is also shown in graphs attached to this letter.

ED_001057_00026684

Factors by Which Obama Drinking Water PAG Proposals Would Exceed Existing EPA Safe Drinking Water Levels

Radionuclide	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water PAG Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water PAG Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water PAG Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	2829	2829	27027	1532	90	2703
Strontium-90	828	828	676	541	34	
Cesium-137	68	68	270	162	1.35	
Plutonium-239	49	49	90	3.6	1.8	

It makes no sense to require people to drink water with, for example, more than 800 times the concentration of strontium-90 than the levels EPA has historically permitted, or thousands or even tens of thousands of times the permissible iodine-131 levels.[9] We oppose any weakening of drinking water standards for radioactivity. The SDWA limits should be complied with.

We note that the water PAGs are not designed for the immediate, early phase after a release, when actions to protect water supplies might arguably be difficult. Instead, the water PAGs are for the intermediate phase, after the emergency has passed, and are to be in place for one to several years after the emergency. Surely the position of EPA should be that drinking water for such a long period should be protected at levels EPA has deemed acceptable under the Safe Drinking Water Act.

Rather than proposing to force people to drink water contaminated at levels hundreds, thousands, or even tens of thousands of times higher than the EPA has historically considered acceptable under the Safe Drinking Water Act, the PAGs should instead do what they are supposed to do: provide protective action guidance for authorities on how to treat contaminated water or provide alternative drinking water supplies after the immediate emergency has passed. This is, of course, what EPA has historically done in the wake of other emergencies—arranged for treatment or alternative water supplies.

We recommend EPA abandon all efforts to set water PAGs that are weaker than the Safe Drinking Water Act limits, and instead, provide real, concrete guidance to authorities on how to safeguard water supplies so as to protect the public.

---

[9] EPA has tried to defend these proposals to dramatically increase allowable radioactivity concentrations in drinking water by asserting that the SDWA limits are "based" on a 70-year lifetime exposure. That is not really true. Under SDWA, drinking water is not to contain radionuclides at concentrations above the Maximum Contaminant Limit (MCL) averaged *over a year*. (Even were that not the case, most of the new values proposed are not seventy times higher than MCLs, but hundreds or thousands of times higher). Similarly, the claim that it is appropriate to allow far higher levels of a radionuclide like I -131 because it is relatively short -lived is misdirected. Under SDWA, as indicated above, one already can average the concentration over a year. There is no need to breach the SDWA.

ED_001057_00026684

2. The PAGs Propose Dramatically Relaxing EPA's Long-Term Cleanup Requirements

EPA has historically required even the nation's most contaminated sites to be cleaned up to a level deemed protective, defined as within EPA's long-held acceptable risk range, which aims for a risk level of one in a million (10^{-6} risk) but allowing no more than one in 10,000 people exposed to get cancer (a 10^{-4} risk) from that exposure. EPA has thus established Preliminary Remediation Goals (PRGs) for both radionuclides[10] and hazardous chemicals[11] and a flexible process by which, if unusual circumstances make reaching the PRGs difficult, less protective standards can be adopted so long as they are within the risk range. These risk levels have been accepted as reasonable for even huge, heavily contaminated Superfund sites (e.g. Hanford) that are half the size of a state, and thus should not be relaxed in the PAGs. The main reason for the reduction in protection is to save money and liability for industries and agencies that carry out practices that could result in large radioactive contamination, mainly the nuclear power industry and the atomic weapons fuel chain agencies and their contractors.

EPA now proposes in the PAGs that this long-followed protective approach and acceptable risk range be jettisoned and that extraordinarily higher concentrations of radionuclides be allowed to remain in soil for the long-term with no effort at cleanup. While not using the controversial term "optimization" from the Bush-era proposed PAGs, language in the PAGs could permit some to say that EPA now merely proposes optimization without calling it that. No risk-based cleanup standards for long-term cleanup would be established in the PAGs, even as a baseline, but rather a vague, undeveloped, makeshift process would be followed whereby cleanup standards would be established after the fact, based on factors other than public health. For example, the PAGs contemplate letting the desire of industry or federal agencies to not have to pay for cleaning up contamination they have created by a release override the public's need to be protected. This is unacceptable.

Just as EPA tried to relegate the proposed weakening of drinking water standards to footnotes, EPA also appears to be trying to weaken long-term cleanup standards by vague references to the DHS 2008 PAGs and by cooperating with an outside group with strong nuclear ties, the National Council on Radiation Protection and Measurements (NCRP) which recommends grossly weakened cleanup guidelines via an NCRP guidance document.

Especially troubling is the process by which EPA chose to pursue the path of weakening long-term protection of the public. For example, two EPA staffers from relevant EPA Offices[12]

---

[10] http://epa-prgs.ornl.gov/radionuclides/

[11] http://www.epa.gov/reg3hwmd/risk/human/rb -concentration_table/index.htm
These regional values are used nationally.

[12] John Edwards, head of the radiation protection division of the Office of Radiation and Indoor Air, and John Cardarelli from the Office of Emergency Management. EPA claims they participated with NC RP on their own but has not provided evidence that they took time off and that the activity was not approved by their superiors at EPA.

ED_001057_00026684

influential in developing the EPA PAGs participated in writing the NCRP guidance document which presses EPA to weaken, to an extraordinary degree, its long-term cleanup standards. This is significant because EPA staff from other Offices attempting to retain existing radiation protection levels were not included on the NCRP team. This internal EPA conflict and the apparent conflict of interest in EPA staff participating at all in the private NCRP effort at pushing EPA to relax its cleanup goals, while representing only one side of the internal EPA debate, has been reported on in the media, pursued via Freedom of Information Act requests and a letter from Public Employees for Environmental Accountability to then-EPA Administrator Jackson[13] but EPA has failed to respond meaningfully.

The EPA PAGs DO NOT incorporate the full DHS PAGs on long-term cleanup, only a subsection dealing with general process matters about consultation (reprinted in section 4.1.6 of the EPA PAGs, pp. 55-59). The DHS PAGs sections on "optimization" and use of benchmarks for long-term cleanup are *not* included in the EPA PAGs. However, a single sentence elsewhere in the EPA PAGs (p. 4, para 4), mentions incorporation of guidance from DHS PAGs' long-term cleanup section, presumably referring to the subsection that is inserted. This poorly crafted sentence, if not clarified, can create subsequent confusion as to whether EPA is incorporating all of the DHS PAGs on long-term cleanup or only the generally innocuous section that is in fact incorporated directly. Since the DHS PAGs are explicitly based on "optimization," and the EPA PAGs are not, and since the DHS PAGs reference "benchmarks" from nuclear advocacy groups like ICRP, NCRP, and IAEA, which have pushed for "acceptable" long-term doses as high as 10 rem per year, with consequent cancer risks as high as 1 cancer per 2 people exposed, whereas the EPA PAGs do not, this potential confusion must be eliminated.

EPA should remove any implication from its PAGs that it is incorporating the DHS PAGs' "optimization" plan and contemplated use of "benchmarks." We recommend that the sentence on p. 4 be rewritten to state, "This EPA Manual substantively incorporates in Section 4.1.6 (pp.55-59) a specific subsection of the late phase cleanup guidance provided in the 2008 DHS document and refers readers to additional planning resources."

The NCRP report--which claims it is designed to provide guidance for both the DHS and EPA PAGs--recommends long-term cleanup standards of 100 to 2000 millirem per year (0.1 to 2 rem per year). That is the equivalent of 50 to 1000 chest X-rays annually, or one a week to three a day every day of one's life for decades. By EPA's own cancer risk estimates, 2 rem per year over a lifetime would result in an excess cancer in one in every six people exposed. Because of the increased risk in earlier years, EPA estimates that even just thirty years exposure from birth would result in a cancer in one in eight people exposed.[14] These risk levels are orders of magnitude higher than EPA's long-accepted risk range.

Additionally, NCRP proposes specific levels of radionuclides that should be allowed to remain in soil and not cleaned up, with people exposed for decades to that radiation without protective actions having been undertaken. Those levels are extraordinarily higher than EPA's

---

[13] http://www.nti.org/gsn/article/epa -withholds-information-dirty-bomb-report-amid-cancer-concerns/; http://www.peer.org/assets/docs/epa/ 4_5_10_PEER_Radiation_ltr_to_EPA.pdf

[14] See footnote 3 above.

ED_001057_00026684

Preliminary Remediation Goals (PRGs), or even the upper limit of EPA's acceptable residual contamination (one hundred times the PRG). We have attached tables and figures showing the extreme exposures these proposals would produce compared to anything EPA has ever said in the past was acceptable. For some radionuclides, the NCRP proposed "acceptable" contamination levels would be hundreds of thousands or even millions of times higher than what EPA's remediation goals are at the nation's most contaminated sites, for the same exposure scenario.

We thus oppose the long-term cleanup section of the EPA PAG as written, and any potential linkage of the EPA PAG to DHS' PAGs' "optimization" process and/or to the NCRP recommendations or those of other bodies that push for increased radiation exposures of the public.[15] EPA should stick to its longstanding principles and require cleanup to its standards for the most contaminated sites in the country, CERCLA. In extraordinary circumstances, there are already provisions whereby one can make an exception if one absolutely has to, but even then one still aims to get as close to the CERCLA risk range as possible. The PAGs as written, however, suggest a concerted attack by proponents of weakening public protections, and this should not be allowed.

3. The Elimination of Relocation PAGs for High Thyroid and Skin Doses and for High Projected Cumulative Whole Body Doses

EPA's 1992 PAGs, which the current document revises, require relocation if thyroid or skin doses over certain specified limits are predicted. Again, it is important to remember that PAGs are doses that are to be *avoided* by protective actions. The new PAGs eliminate both requirements. We believe that is inadvisable.

EPA claims it is removing the skin and thyroid relocation PAGs to "avoid confusion." This makes no sense. If predicted doses to the skin or thyroid are likely to be very large, one needs to be protecting people by getting them out of harm's way. The fact that some people in some situations may have access to potassium iodide (KI) doesn't obviate the need to relocate those who don't. And KI does nothing to protect against skin cancer; its sole use is aimed at the thyroid.

Additionally, the longstanding PAGs require protective action to assure people do not get exposed to more than 5 rem over 50 years. This has been jettisoned as well. Obviously, if some within EPA are pushing to allow long-term doses as high as 2 rem per year over many decades (60 rem over 30 years, 140 rem over a lifetime), a 5 rem cumulative cap would prevent that. That apparently is behind their desire to eliminate the lifetime cap. The cap should remain and in fact be tightened considerably (see discussion in section 6 below).

[15] We incorporate herein by reference comments submitted on the NCRP recommendations, found at http://committeetobridgethegap.org/wp -content/uploads/2013/04/ncrp -short-comments-from-multiple-groups.pdf and http://committeetobrid gethegap.org/wp-content/uploads/2013/04/CBGNIRSPSRSCFS -updated.pdf

ED_001057_00026684

4. The Recommendation to Permit Radioactive Waste to Be Disposed of In Unlicensed Disposal Sites, Including Regular Municipal Garbage Dumps

Nuclear advocates have long pushed to deregulate significant portions of the radioactive waste stream and permit such wastes to be disposed of in sites neither licensed nor designed for radioactive materials, including municipal garbage dumps. This has largely been driven by a desire to cut safety corners so as to save money for industry and government.

The PAGs strongly push for elimination of the existing requirements that radioactive waste go to sites licensed and designed for radioactive waste. We oppose such an effort. Again, EPA seems intent on weakening protections. PAGs are supposed to be guides for *protective action*, not an effort to eliminate protections.

The section on waste disposal issues in Chapter 4 of the PAGs, *Guidance for the Late Phase,* appears to have been written with little or no historical knowledge about the widespread public opposition over past decades in the United States to proposals for deregulation, free release, clearance or below-regulatory-concern (BRC) designation of radioactive waste from both nuclear power and weapons facilities. The suggestion to allow nuclear waste into RCRA C and D Hazardous and Solid waste facilities is both cavalier and dangerous. Allowing the waste to go into and contaminate or poison commercial recycling has also been soundly rejected. We oppose sending nuclear waste to facilities that are not specifically licensed for radioactive materials, including but not limited to solid and hazardous landfills, incinerators, processors and recycling facilities.

Some of the reasons to keep nuclear waste out of facilities not specifically licensed for radioactive materials include inevitable leakage, the potential intermixing of radioactive materials with chelating and organic complexing agents that greatly enhance the migration of the radioactivity into groundwater and surface water, risk of fire in a landfill with both radioactive and regular wastes as is currently occurring at the West Lake landfill in Missouri, failure to consider the ability of RCRA facilities to isolate the wastes they are licensed to dispose, shorter institutional control periods, failure to inform and protect workers, and lack of detailed radiation monitoring of air, soil, and water. Recycling radioactively contaminated materials into the consumer metal supply rather than disposing of them in licensed radioactive sites is not acceptable.

EPA should have reviewed the public comments which clearly rejected their previous efforts[16] in the mid 1990's, 2001 and 2003 to allow nuclear waste into solid and hazardous facilities and into recycling to make consumer goods.

EPA gives lip-service to inclusivity in the PAGs, ignoring the reality that deregulating (or never requiring radioactive regulation) of nuclear waste from incidents and releases will

[16] 1996-1998 EPA consideration, publication and rejection of rules to legalize contaminating metal recycling with radioactive metal; 2001 66 Fed Reg 27218 May 16, 2001 to allow mixed waste to go to nuclear waste sites; 2003 ANPR 65120 68 Fed Reg 222, Nov 18, 2003 to consider "non -regulatory approaches" for radioactive waste management.

ED_001057_00026684

disproportionately impact people of color and low income communities which is where the solid and hazardous waste facilities frequently are located and where new ones tend to get sited.

We encourage EPA, the other federal agencies and states to focus their efforts on *preventing* nuclear power incidents rather than pushing to relax cleanup and disposal safety requirements.

5. The Inappropriate Expansion of the PAGs to Cover Essentially All Radioactive Releases, from The Most Extraordinary (e.g. Nuclear Weapons Explosions) to Those Far Less Consequential (e.g. Small Transportation Accidents)

The DHS PAGs mixed the absolutely extraordinary event—detonation by a terrorist of a nuclear weapon in the U.S.—with vastly less consequential events involving "dirty bombs" of a range of sizes, including very small ones. It was inappropriate to suggest the same standards for such varying incidents. If a nuclear bomb explodes, all bets are off. If a small dirty bomb is detonated, normal response procedures and cleanup requirements can take care of it. By mixing the huge and the small and requiring the same lax standards, a disservice is being done.

EPA has now greatly compounded that problem by expanding its PAGs from dealing with a catastrophic release from a nuclear power plant meltdown to covering all radioactive releases, including such events as transportation accidents and incidents at radiopharmaceutical facilities.[17] Indeed, under the PAGs definition of its scope—dealing with any radioactive release for which a protective action may be required—it is hard to see what might not be covered or how CERCLA, which is EPA's longstanding statutory program for dealing with such releases would still exist, despite *pro forma* language in the PAG to the contrary.

By creating a single set of standards to address both a Fukushima-type event and a truck carrying a shipment of medical isotopes that goes off the road, one creates a useless PAG and the prospect of greatly relaxed cleanup and protection standards for many events for which there is no question that current standards and response approaches under CERCLA are fully adequate. We oppose this effort to expand the PAGs to essentially encompass every radioactive release.

6. Relying on PAG Dose Limits As High As Or Higher Than Those In Effect Decades Ago Despite the Fact That Official Estimates of Cancer Risks from Radiation Have Increased Significantly Over That Period

In addition to eliminating some important dose triggers for protective action in the older PAGs, EPA carries forward old limits that have been in place for decades, despite EPA's own official estimates of radiation risk per unit dose having markedly increased during that time. The updated official consensus is that radiation is considerably more harmful than was known when the earlier levels were established. EPA fails to improve protection based on the newer, higher

[17] EPA PAG Manual 2013, page 4 section 1.3.4 "This updated Manual applies PAGs and protective actions to an expanded range of sources of potential radiological releases, include commercial nuclear power facilities, uranium fuel cycle facilities, nuclear weapons facilities, transportation accidents, radiopharmaceutical manufacturer and users, space vehicle launch and reentry, RDDs and INDs."

ED_001057_00026684

risk, and in fact allows for reduced protection instead. For example, the 1992 PAG values incorporated into the newest PAG are based on the National Academy of Sciences' BEIR III study (and in fact, go even far further back than that). But BEIR V increased those risk estimates three- or four-fold, and BEIR VII increase those an additional 35%. EPA has adopted those values in its most recent Blue Book. So, despite officially acknowledging that radiation is four or five times more dangerous than assumed when the 1992 PAGs were established, EPA now merely uses the same dose limits without any effort to tighten them by a factor of four or five.

We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

7. The PAGs Incorporate Archaic and Extremely High FDA Food Contamination Guidelines, Apparently Without Updated Review

EPA simply by reference incorporates old FDA guidelines for food contamination. These food radiation exposures would be on top of doses from other exposures (e.g., inhalation, groundshine) adding significantly to cumulative doses to the public. The old FDA guidelines are based on even older guidance, and none of the dose limits have been reduced over time to reflect the increased official risk estimates discussed above.

The old FDA guidance allows—from the food pathway alone—500 millirems exposure per year. This means that the food one eats each day would produce a radiation dose equivalent of a chest X-ray every day. The FDA food guidance limits appear to have no time limit; food contaminated at these levels would be permitted to be consumed over a lifetime. At these dose levels, EPA's risk estimates indicate a lifetime risk of 4×10^{-2}, or every 25th person eating food contaminated at those levels getting a cancer from it. This is simply unacceptable, and EPA should reject any such proposed guidance. At minimum, if EPA really intends to accept such doses, it should be candid with the public and say that those "acceptable" levels, by its own estimate, would produce an excess cancer in 4% of the public. We think that would be a hard sell ethically, and EPA should thus rethink adoption of such extraordinarily lax protection levels.

SUMMARY OF RECOMMENDATIONS

We recommend the April 2013 draft PAGs be withdrawn.

We oppose any weakening of drinking water standards for radioactivity. The Safe Drinking Water Act limits should be complied with. The PAGs should do what they are supposed to do: provide protective action guidance for authorities on how to treat contaminated water or provide alternative drinking water supplies over the one to several years after the immediate emergency has passed. This is, of course, what EPA has historically done in the wake of other emergencies—arranged for treatment or alternative water supplies.

ED_001057_00026684

We recommend EPA abandon all efforts to set water PAGs that are weaker than the Safe Drinking Water Act limits, and instead, provide real, concrete guidance to authorities on how to safeguard water supplies so as to protect the public to those levels or better.

The PAGs contemplate letting the desire of nuclear industry and federal agencies to not have to pay for cleaning up contamination they have created by radioactive releases override the public's need to be protected. This is unacceptable.

EPA should remove any implication from its PAGs that it is incorporating into responding to non-terrorist radiological events the Department of Homeland Security PAGs' "optimization" plan and contemplated use of "benchmarks" that would be outside EPA's historical acceptable risk range.

We oppose the long-term cleanup section of the EPA PAG as written, and the potential linkage of the EPA PAG to DHS' PAGs' "optimization" process, and to the NCRP recommendations or those of other bodies that push for increased radiation exposures of the public. EPA should stick to its longstanding principles and require cleanup to its standards for the most contaminated sites in the country, CERCLA. The PAGs as written suggest a concerted attack by proponents of weakening public protections, and this should not be allowed.

Do not remove, but instead retain and strengthen, relocation PAGs for thyroid and skin doses.

Do not remove, in fact EPA should strengthen, the longstanding PAGs that require protective action to assure people do not get exposed to more than 5 rem over 50 years.

The outdated FDA food contamination guidelines should be replaced with markedly lower permissible concentrations of radioactivity in food.

We oppose sending nuclear waste to facilities that are not specifically licensed for radioactive materials including but not limited to solid and hazardous landfills, incinerators, processors and recycling facilities. We encourage EPA, the other federal agencies and states to focus on *preventing* nuclear power incidents rather than weakening protection of the public in case of such releases.

We oppose the effort to expand the PAGs to essentially encompass every radioactive release.

We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

Conclusion

Protective Action Guides are supposed to provide guidance for actions to protect the public from radiation. The current PAGs do the opposite—recommend grossly increased risks to the public without protection. We urge that the PAGs be withdrawn.

Sincerely,

ED_001057_00026684

National

Daniel Hirsch*
Committee to Bridge the Gap
California

Diane D'Arrigo*
Nuclear Information and Resource Service
Takoma Park, MD

Lois Gibbs, Anne Rabe
Center for Health, Environment and Justice
Falls Church, Virginia

Jeff Ruch
Public Employees for Environmental Responsibility (PEER)
Washington, DC

Matthew McKinzie, Ph.D.
Nuclear Program
Lands and Wildlife Program
Natural Resources Defense Council
Washington, DC

Catherine Thomasson, MD
Physicians for Social Responsibility
Washington, DC

Ben Schreiber
Climate and Energy Program
Friends of the Earth
Washington, DC

Susan Corbett
Nuclear Free Campaign
Sierra Club

Lynn Thorp, National Campaigns
Clean Water Action
Washington, DC

Wenonah Hauter
Food and Water Watch
Washington, DC

Tyson Slocum
Public Citizen
Washington, DC

Cindy Folkers
Beyond Nuclear
Takoma Park, MD

Jim Riccio
Greenpeace
Washington, DC

Ken Bossong
SUN DAY Campaign
Takoma Park, MD

Mike Ewall, Esq.
Energy Justice Network
Washington, DC

Jonathan Evans
Toxics and Endangered Species Campaign
Center for Biological Diversity
San Francisco, CA

International

Tim Seitz
Ontario Clean Air Association OCAA
Kingston, Ontario Canada

Monica Wilson, **GAIA**
Global Allian ce for Incinerator Alternatives
Berkeley, California

Kerry Meydam
Durham Environment Watch
Courtice, Ontario Canada

Lynn Howard Ehrle
International Science Oversight Board of the Organic Consumers Association
Plymouth, Michigan

Kimberly Roberson
Fukushima Fallout Awareness Network
California, Washington DC, Japan

* Points of contact for this letter: Daniel Hirsch, dhirsch1@cruzio.com, (831) 336-8003, and Diane D'Arrigo, dianed@nirs.org, (301) 270-6477.

State and Regional

Mary Lampert
Pilgrim Watch
Duxbury, MA

Sheldon C. Plotkin, Ph.D., P.E.
Southern California Federation of Scientists

Bonnie Urfer and John LaForge
N U K E W A T C H
The Progressive Foundation
Luck, WI

Joni Arends
Concerned Citizens for Nuclear Safety
Santa Fe, NM

Charmaine White Face
Defenders of the Black Hills
Rapid City, SD

Courtney Hanson
Georgia Women's Action for New Directions (WAND)
Atlanta, Georgia

Carol E. Gay
NJ State Industrial Union Council
Allenwood, NJ

Louis A. Zeller
Blue Ridge Environmental Defense League
Glendale Springs, NC

Liz Woodruff
Snake River Alliance
Idaho

Michael Welch
Redwood Alliance
Arcata, CA

Don Safer, John McFadden
Tennessee Environmental Council
Nashville, TN

Sara Barczak
High Risk Energy Choices Program
Southern Alliance for Clean Energy
Knoxville, TN

Sandra Gavutis
C-10 Research & Education Foundation
Newburyport, MA

Steve Brittle
Don't Waste Arizona
Phoenix, AZ

Hope Taylor, MSPH
Clean Water for North Carolina
Asheville and Durham, NC

Judy Treichel
Nevada Nuclear Waste Task Force
Las Vegas, NV

Karen Hadden
Sustainable Energy & Economic Development (SEED) Coalition
Austin, Texas

Marylia Kelly
Tri-Valley CAREs (Communities Against a Radioactive Environment)
Livermore, California

Kay Cumbow
Citizens for Alternatives to Chemical Contamination
Lake Station, Michigan

Gerry Pollet, JD
Heart of America Northwest
Seattle, WA

Alan Muller, Executive Director
Green Delaware
Port Penn, DE

Bradley Angel
Greenaction for Health and Environmental Justice
San Francisco, CA

John Blair
Valley Watch
Evansville, Indiana

Kathleen Ferris
Citizens to End Nuclear Dumping in Tennessee (ENDIT)
Murfreesboro, Tennessee

Arnold Gore
Consumers Health Freedom Coalition
New York, NY

Linda Seeley
Terra Foundation
San Luis Obispo, CA

Judi Friedman
People's Action for Clean Energy (PACE)
Canton, CT

Judith Mohling
Rocky Mountain Peace and Justice Center
Boulder, Colorado

Colorado Coalition for the Prevention of Nuclear War
Denver Colorado

Alliance For A Clean Environment
Dr. Lewis Cuthbert
Pottstown, PA

Alice Slater
Nuclear Age Peace Foundation
New York, NY

Dave Kraft
Nuclear Energy Information Service
Chicago, IL

Barbara O'Neal
Erwin Citizens Awareness Network, Inc.
Erwin, TN

Barbara Warren
Citizens' Environmental Coalition
Albany, NY

Br. Senji Kanaeda and Br. Gilberto Perez
Nipponzan Myohoji Dojo
Bainbridge Island, Washington

Sharon E. Lewis, Executive Director
Connecticut Coalition for Environmental Justice
Hartford, CT

Charles K. Johnson, Director
Physicians for Social Responsibility
Task Force on Nuclear Power
Oregon and Washington

Kelly Campbell
Oregon **Physicians for Social Responsibility**
Portland, Oregon

Kaye Kiker
Citizens Task Force
Mentone, Alabama

Judy Braiman
Empire State Consumer Project
Rochester, New York

Lilias Jarding
Clean Water Alliance
Rapid City, South Dakota

Lisa A. Coons
Center for Earth Spirituality and Rural Ministry Mankato, MN

Craig Fiels
Sustainable Economic Solutions
Oakland, CA

Chris Borello
Concerned Citizens of Lake Township Uniontown IEL Superfund Site
Ohio

Diane Swords
Peace Action CNY
Syracuse, NY

Dr. Kelly Sutton
Raphael Medicine & Therapies PC
Fair Oaks CA

Cara L. Campbell Ecology Party
Ecology Party of Florida
Ft. Lauderdale, FL

Aletha
Free Soil Party USA
Los Angeles, California

Elaine Holder
San Luis Obispo Mothers for Peace
San Luis Obispo, CA

Garry Morgan, Elizabeth Johnson
Bellefonte Efficiency and Sustainability Team BEST/Mothers Against Tennessee River Radiation MATRR
Alabama, Tennessee

Ernest Fuller
Concerned Citizens for SNEC Safety
Six Mile Run, PA

Gene Stone
Residents Organized For a Safe Environment (ROSE)
California

Margaret Sheehan
Project for Energy Accountability
Cambridge, MA

Greg Mello
Los Alamos Study Group
Albuqucrquc, NM

Gwen Dubois
Chesapeake Physicians for Social Responsibility
Maryland

Dagmar Fabian
Crabshell Alliance
Maryland

Cheryl Johncox
Buckeye Forest Council
Columbus Ohio

Heather Cantino
Athens County Fracking Action Network
Athens, Ohio

Joanne Hameister
Coalition on West Valley Nuclear Wastes
East Aurora, NY

Jim Murphy
The Peace Farm
Amarillo, TX

Janet Greenwald
Citizens for Alternatives to Radioactive Dumping
Albuquerque, NM

Jay Sweeney
Green Party of Pennsylvania
Harrisburg, PA

Jim Haber
Nevada Desert Experience
Las Vegas, Nevada

Scott Sklar
The Stella Group, Ltd.
Arlington, VA

Michael J. Keegan
Coalition for a Nuclear Free Great Lakes
Monroe, Michigan

Alice Hirt
Don't Waste Michigan
Holland, Michigan

Jessie Collins
Citizens Resistance at Fermi 2
P.O. Box 331
Monroe, Michigan 48161

Nancy Burton
Connecticut Coalition Against Millstone
Mothers Milk Project
Redding CT

Nancy L Casady
Ocean Beach Organic Food Co-op
San Diego, CA

Patricia Birnie
GE Stockholders Alliance
Sandy Spring, MD

Paul Gallimore
Long Branch Environmental Education
Center, Big Sandy Mush Creek
Leicester, NC

Peggy and Melodye Pryor
Andrews, TX

Roger Herried
Abalone Alliance Clearinghouse
San Francisco, CA

Gladys Schmitz, SSND
Mankato Area Environmentalists Board
Mankato, MN

Sharyn Cunningham
Colorado Citizens Against Toxic Waste, Inc.
Canon City, Colorado

Titus North
Citizen Power, Inc.
Pittsburgh, PA

Tribal Scribal
The Enviro Show WXOJ-LP
Florence, MA

Vanessa Pesec
Network for Oil and Gas Accountability
and Protection (NEOGAP)
Concord Township, Ohio

William S. Linnell
Cheaper, Safer Power
Portland, Maine

William Maurer
Cape Downwinders
Falmouth, MA

Liane Casten
Citizens Act to Protect our Water
(CAPOW)
Evanston, IL

Mal Chaddock
NoNukesNW.org
Portland, OR

Robin Schneider
Texas Campaign for the Environment
Austin, TX

Notes

As to the water PAGs, please note that EPA's Alternative 1, identified in footnote 26 of the PAG, is for the same high dose limit that was put forward in the Bush EPA PAG. EPA had previously identified in the Bush PAG radionuclide concentrations it claimed were associated with that dose, so we used here those concentrations. Secondly, Alternative 4, the first alternative in footnote 24 of the PAG, is really not a set of proposed water limits for emergencies but a set of weaker standards for normal consumption of drinking water and not really relevant to the PAG discussion. Lastly, Alternative 5, the second reference in PAG footnote 24, provides a value for only one radionuclide, iodine-131.

The NCRP's suggested long-term cleanup levels are found in NCRP SC 5-1 Draft Report, "Decision Making for Late-Phase Recovery from Nuclear or Radiological Incidents," February 25, 2013, National Council on Radiation Protection and Measurements.

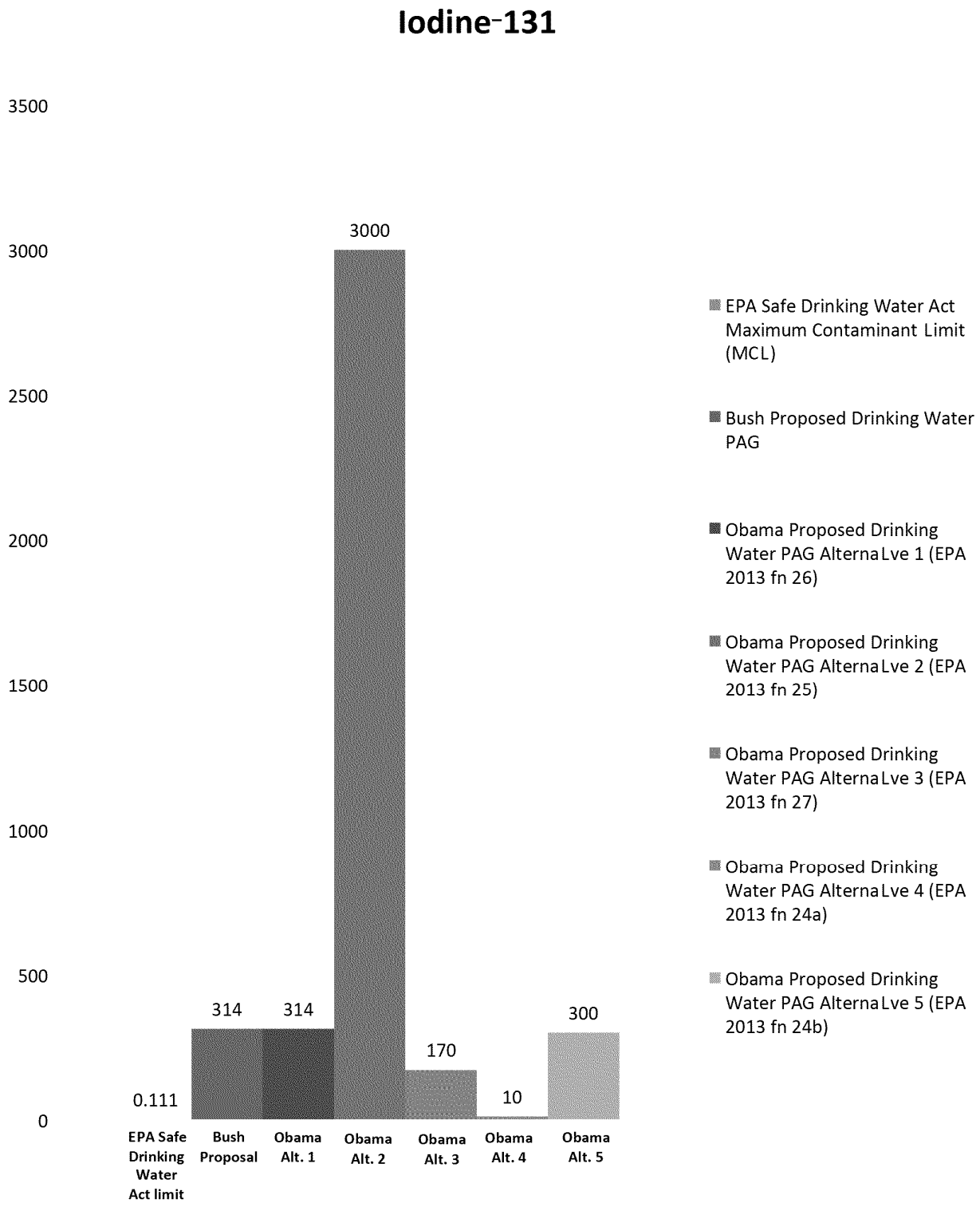
Table 6.4 of the report identifies levels of contamination below which no cleanup would occur based on a 1 mSv/yr dose, for resident farmer, urban resident, and industrial/commercial exposure pathways, and for 95th and 50th confidence intervals. The NCRP report recommends cleanup choices based on a dose range of 1 mSv/yr to 20 mSv/yr (100 mrem to 2000 mrem/yr) and indicates that one just scale up the values in Table 6.4, which are based on 1mSv/yr, to be obtain the concentrations for the 20 mSv/yr limit.

We have taken the NCRP values and compared them to EPA's Preliminary Remediation Goals (PRGs) for the same exposure scenarios—resident farmer and urban resident. We have compared the EPA PRGs to both the 50th and 95th confidence levels concentrations identified by the NCRP report.

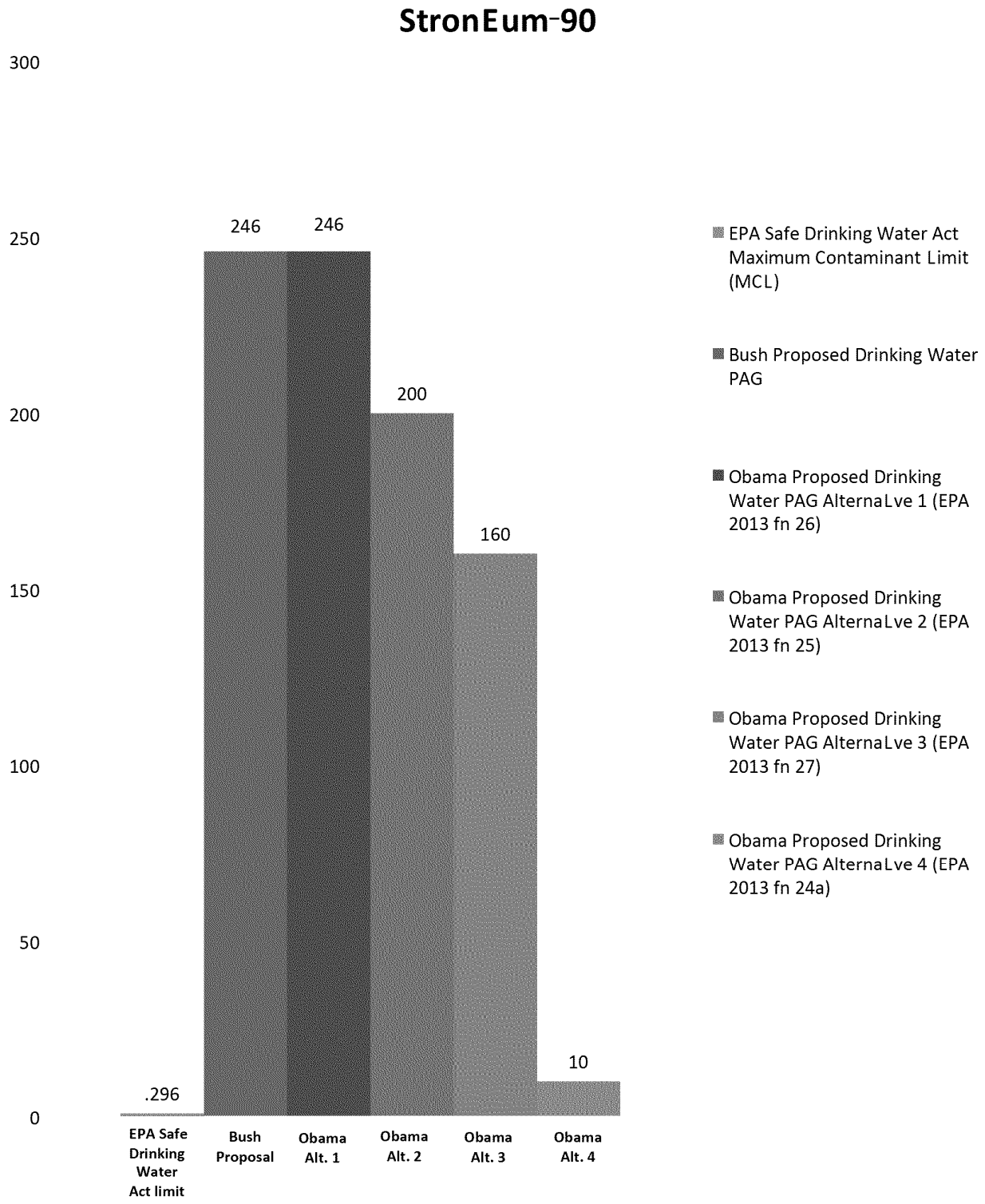
It should be noted that EPA PRGs are the remediation goals, and that in unusual circumstances where one can't meet the goal one can fall back from them, but no more than by two orders of magnitude. In other words, EPA's remediation levels are a range of the PRG to no more than 100 times the PRG. Thus, at the upper end of the NCRP proposed acceptable risk range, for example, for a resident farmer and a 50% confidence interval, NCRP proposed plutonium-239 levels nearly 12 million times higher than EPA's PRG for the same scenario. That would be 120,000 times higher than the upper limit of EPA's risk range.

We gratefully acknowledge the work of Ryan Forster in producing the graphs.

Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides, in Bq/L

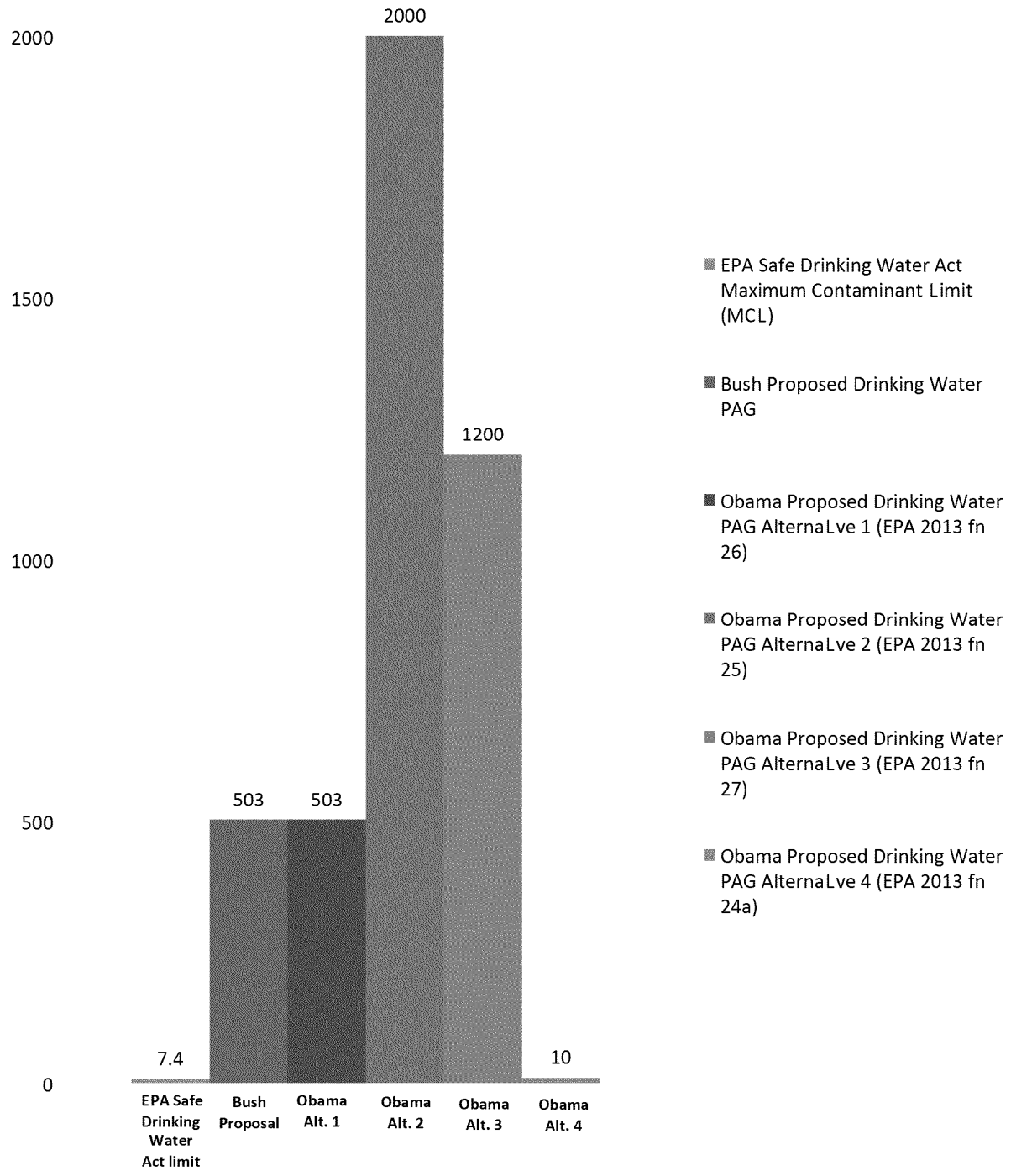


Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides, in Bq/L



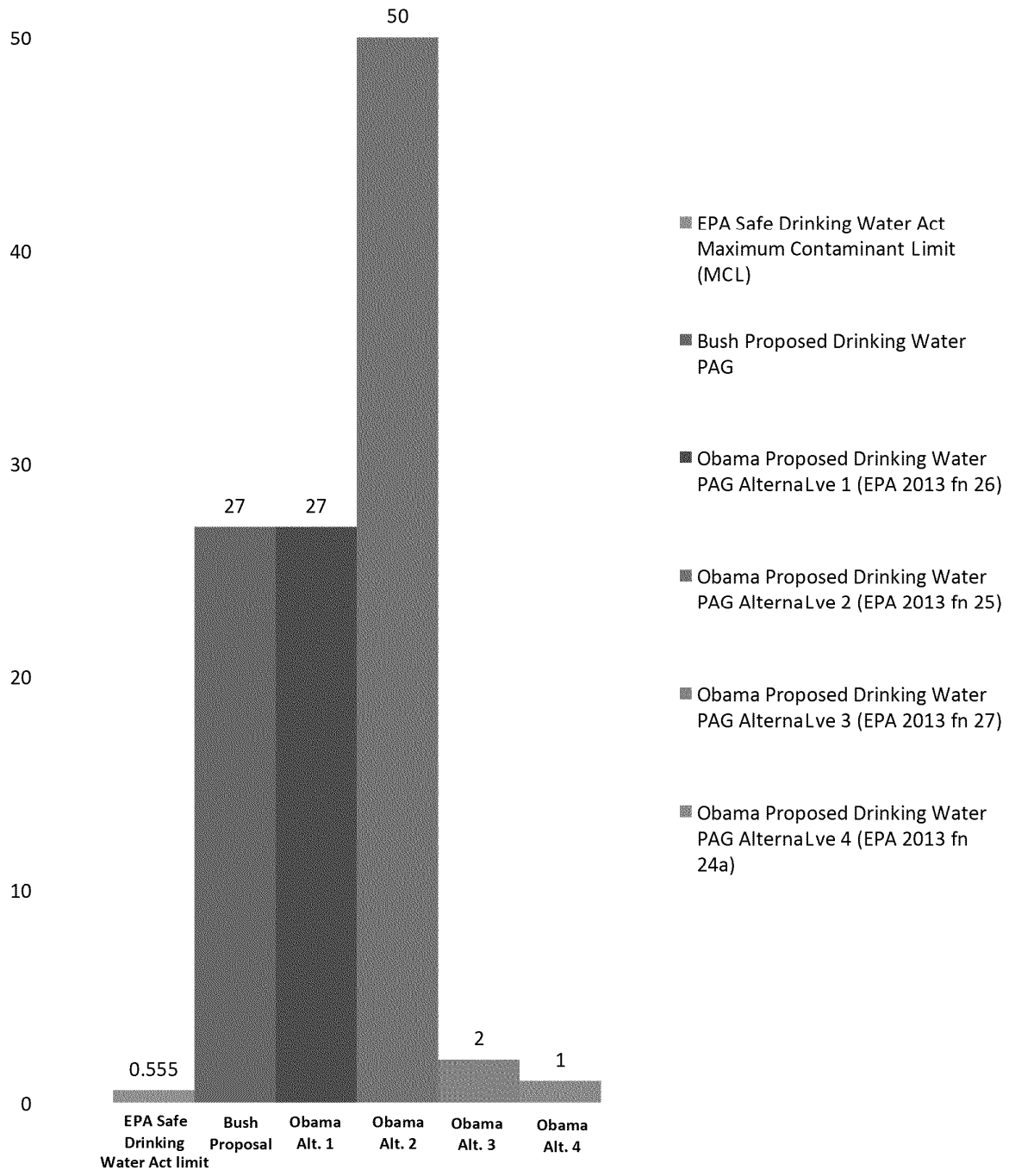
Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides, in Bq/L

Cesium-137

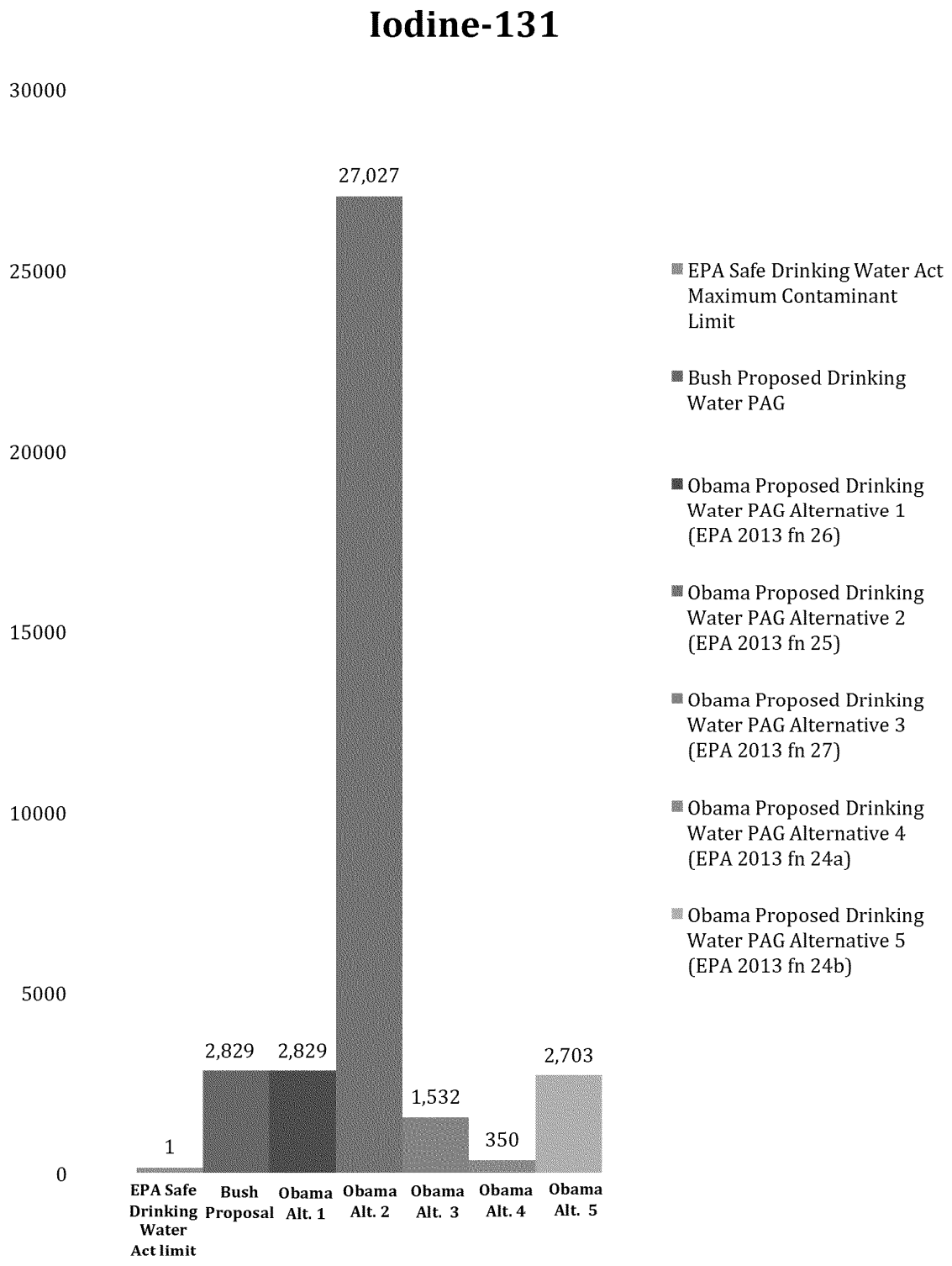


Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides, in Bq/L

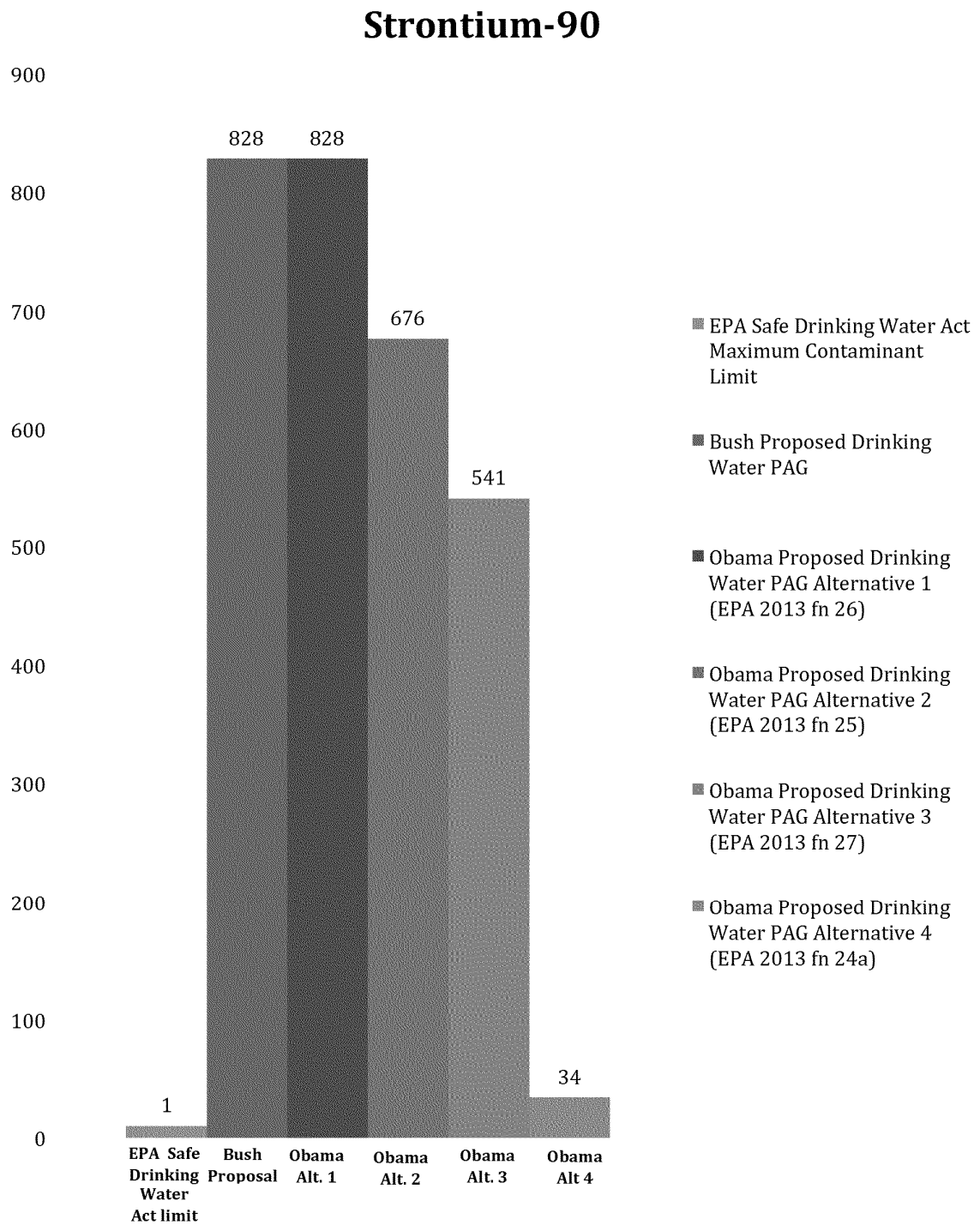
Plutonium-239



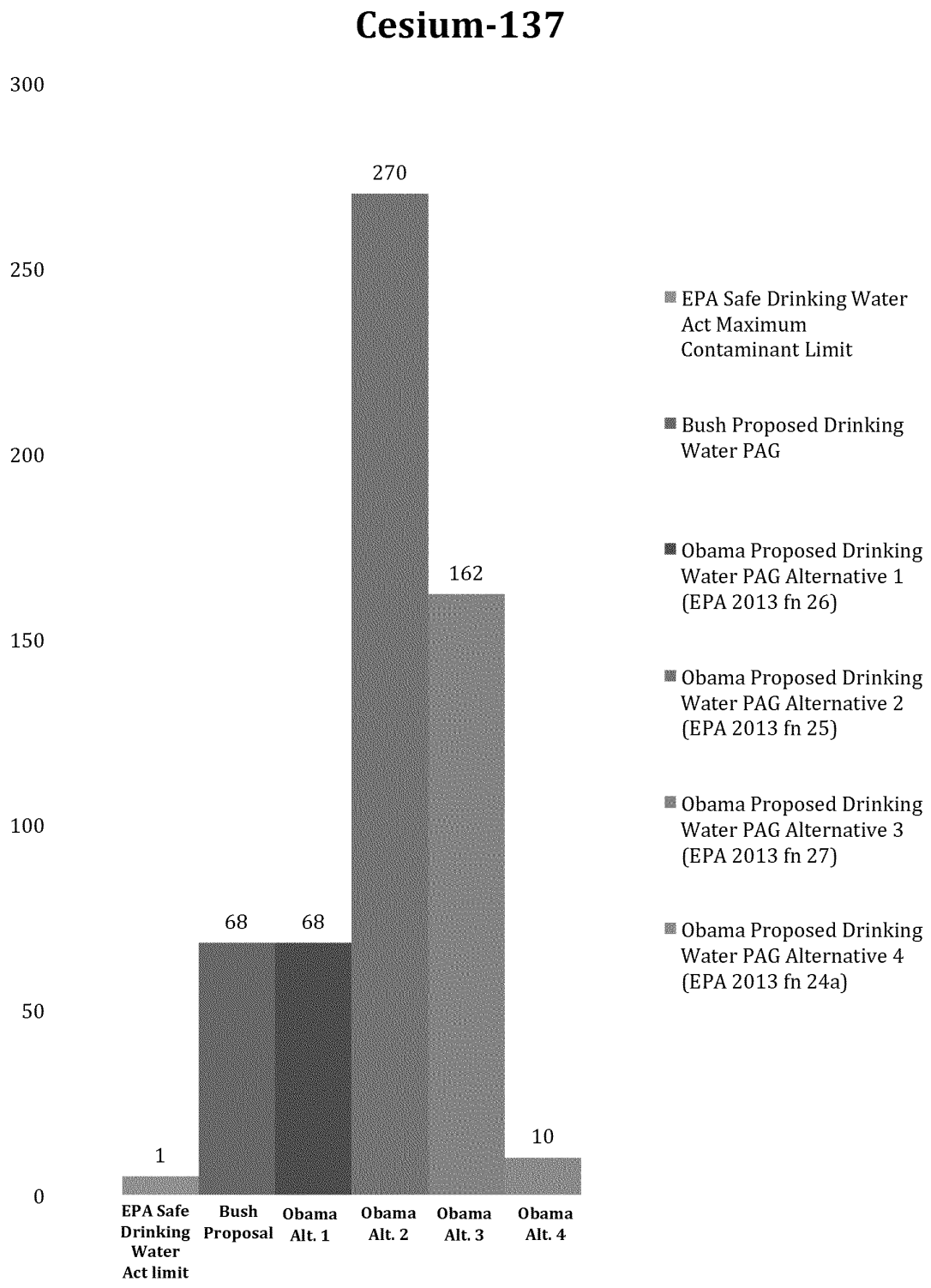
Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted



Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted



Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted



Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted

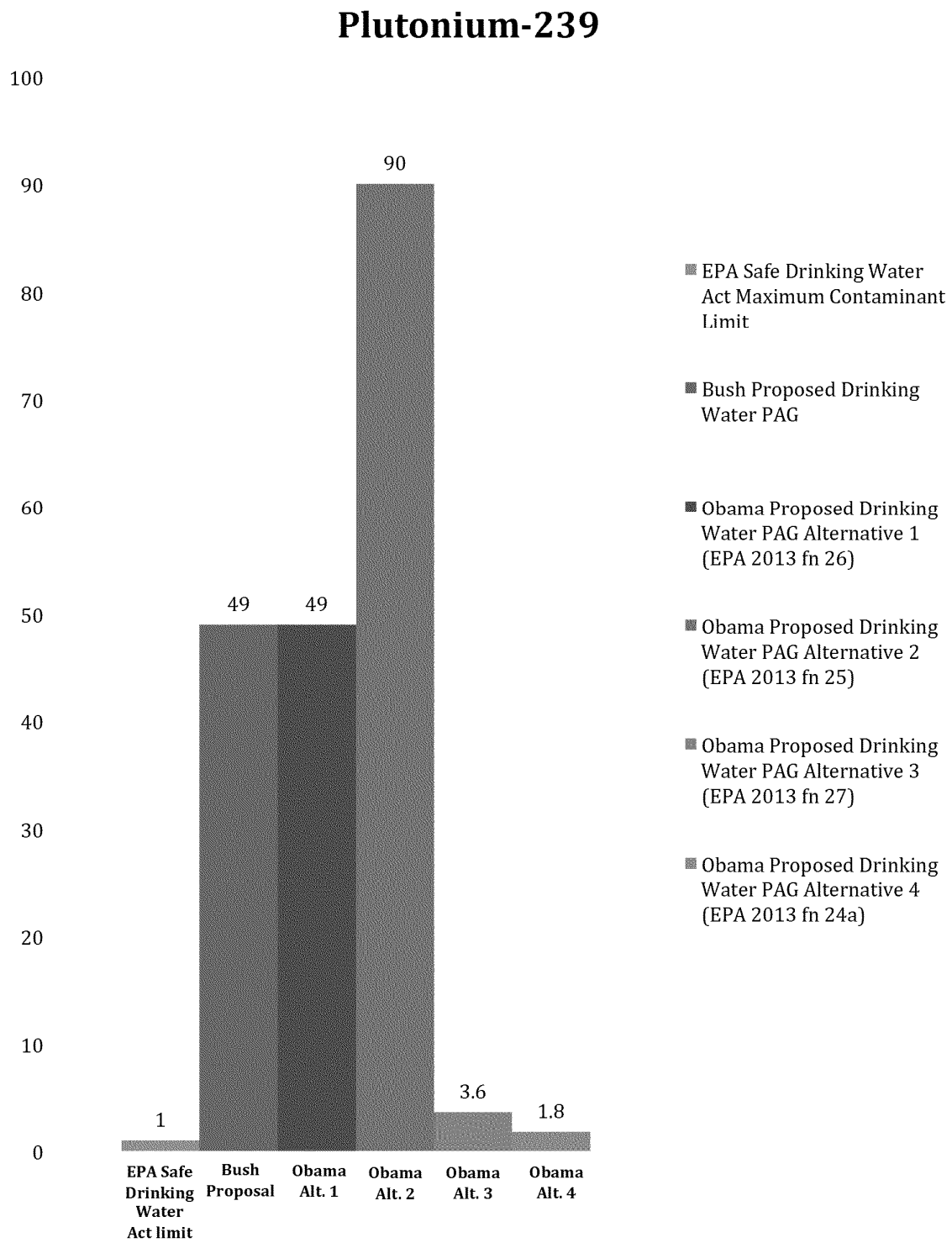


FIGURE 1a

How Many Times More Radioac2vity Would be Permi : ed in Soil for Farmers Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 95% Confidence Level)

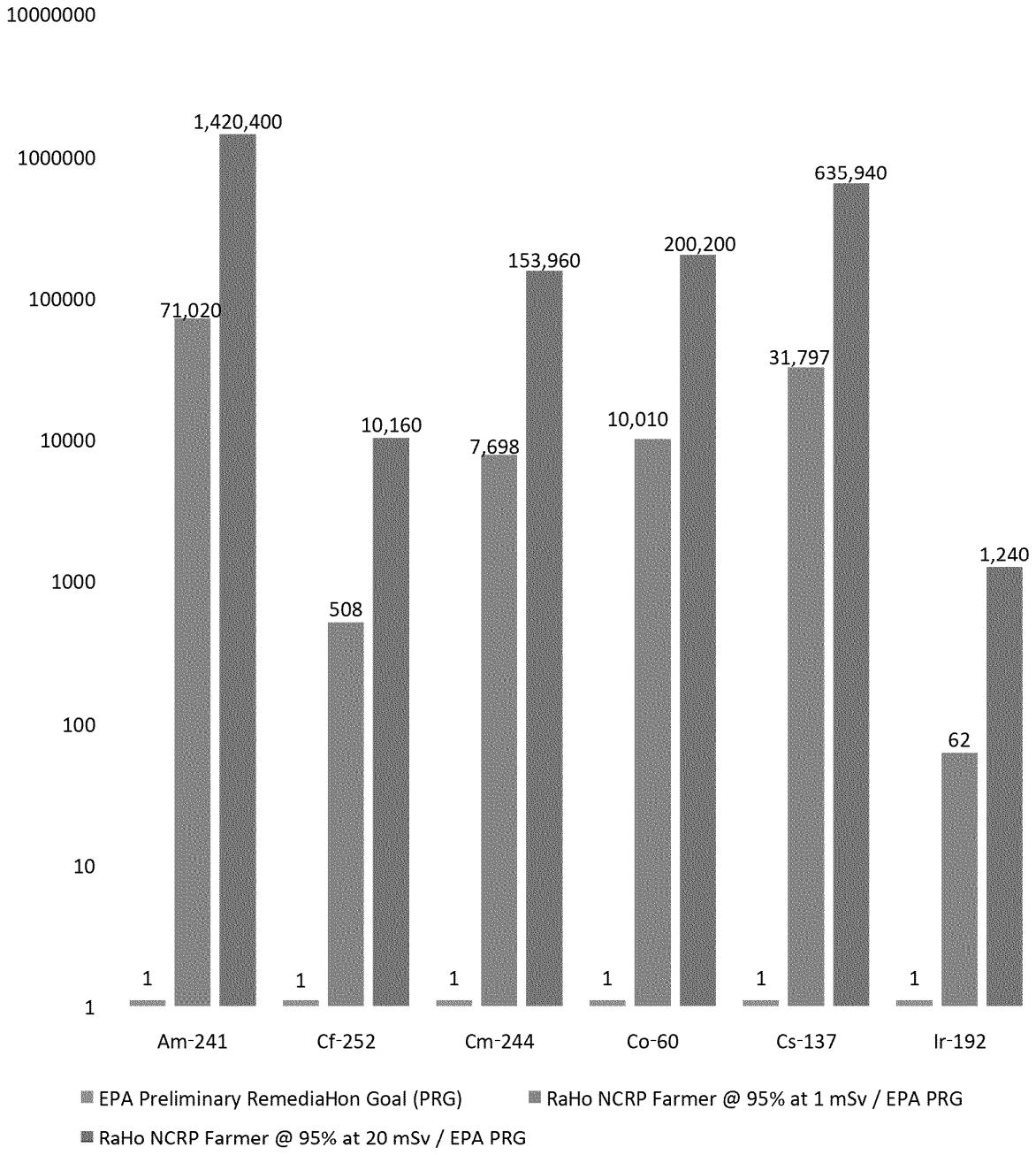


FIGURE 1b

How Many Times More Radioac2vity Would be Permi : ed in Soil for Farmers Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 95% Confidence Level)

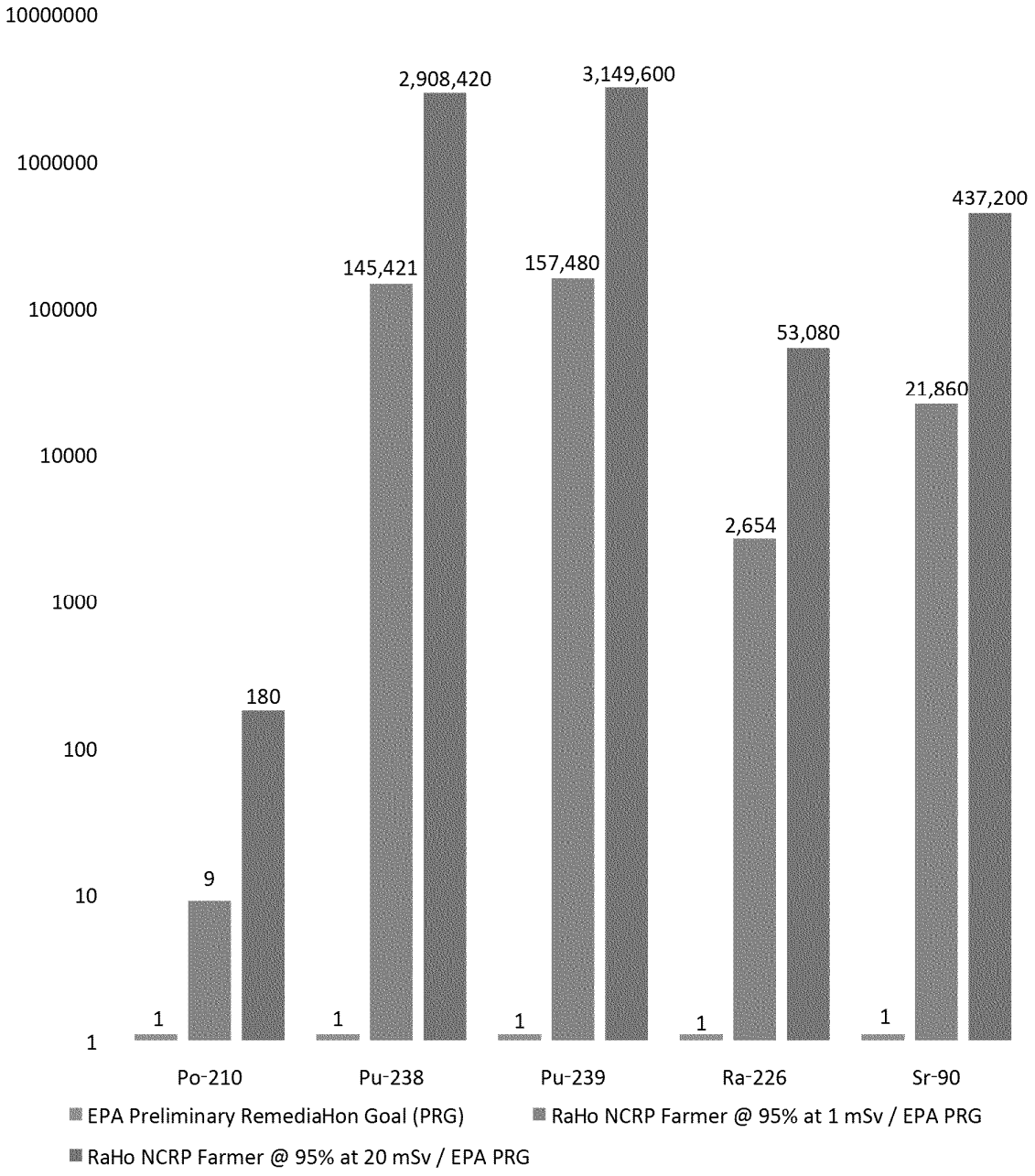


FIGURE 2a

How Many Times More Radioac2vity Would be Permi : ed in Soil for Farmers Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 50% Confidence Level)

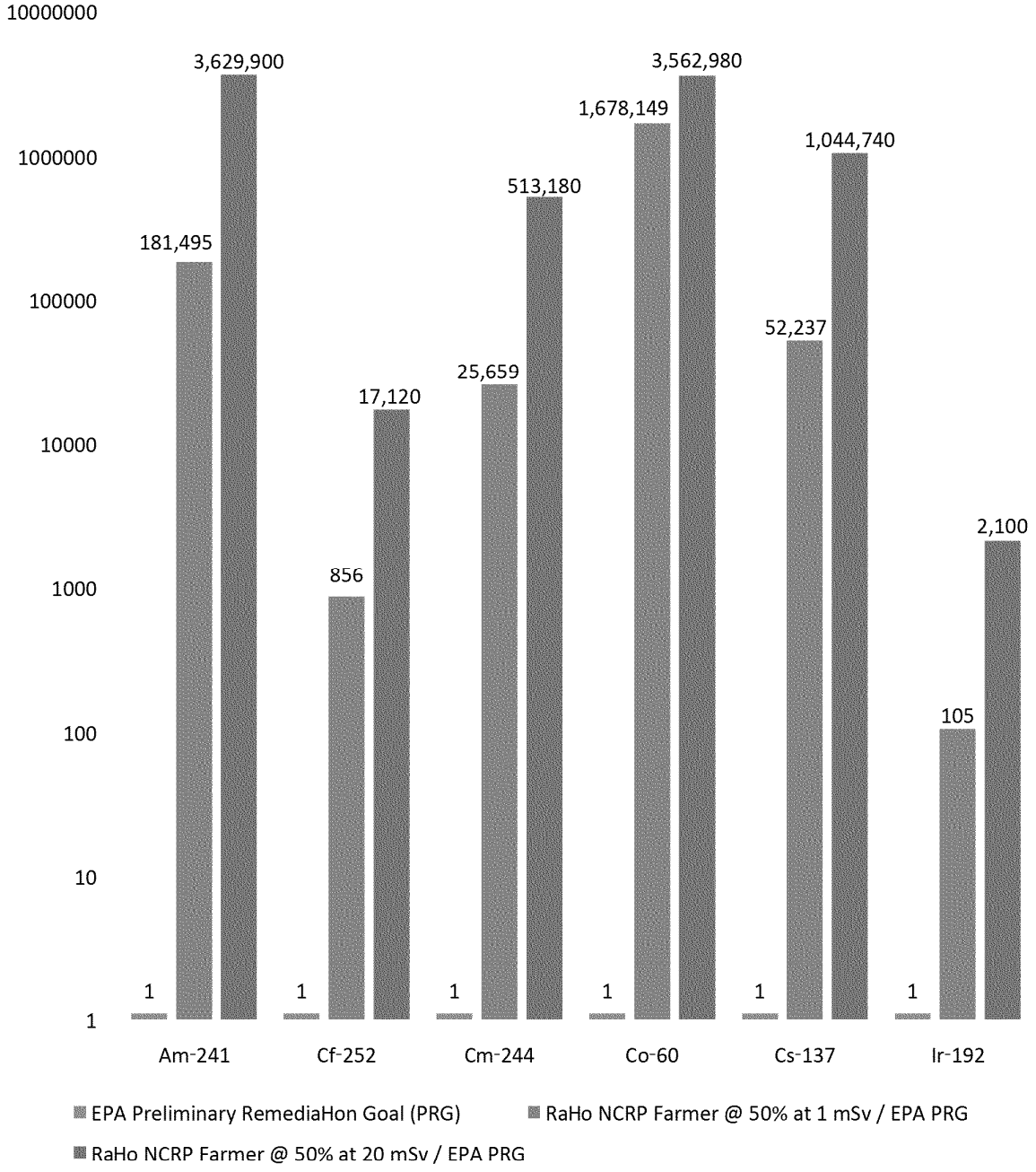


FIGURE 2b

How Many Times More Radioac2vity Would be Permi : ed in Soil for Farmers Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 50% Confidence Level)

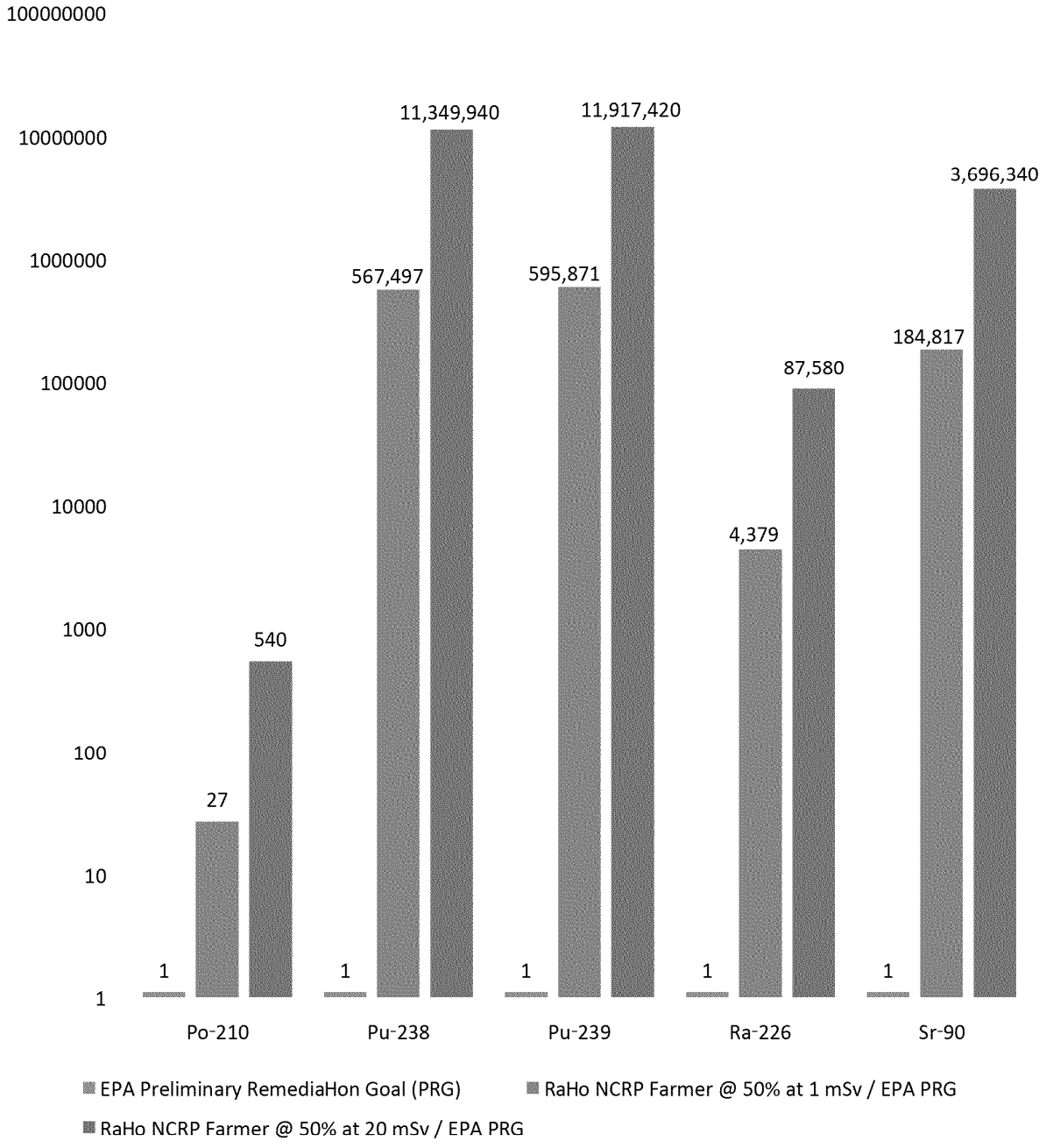


FIGURE 3a

How Many Times More Radioac2vity Would be Permi : ed in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 95% Confidence Level)

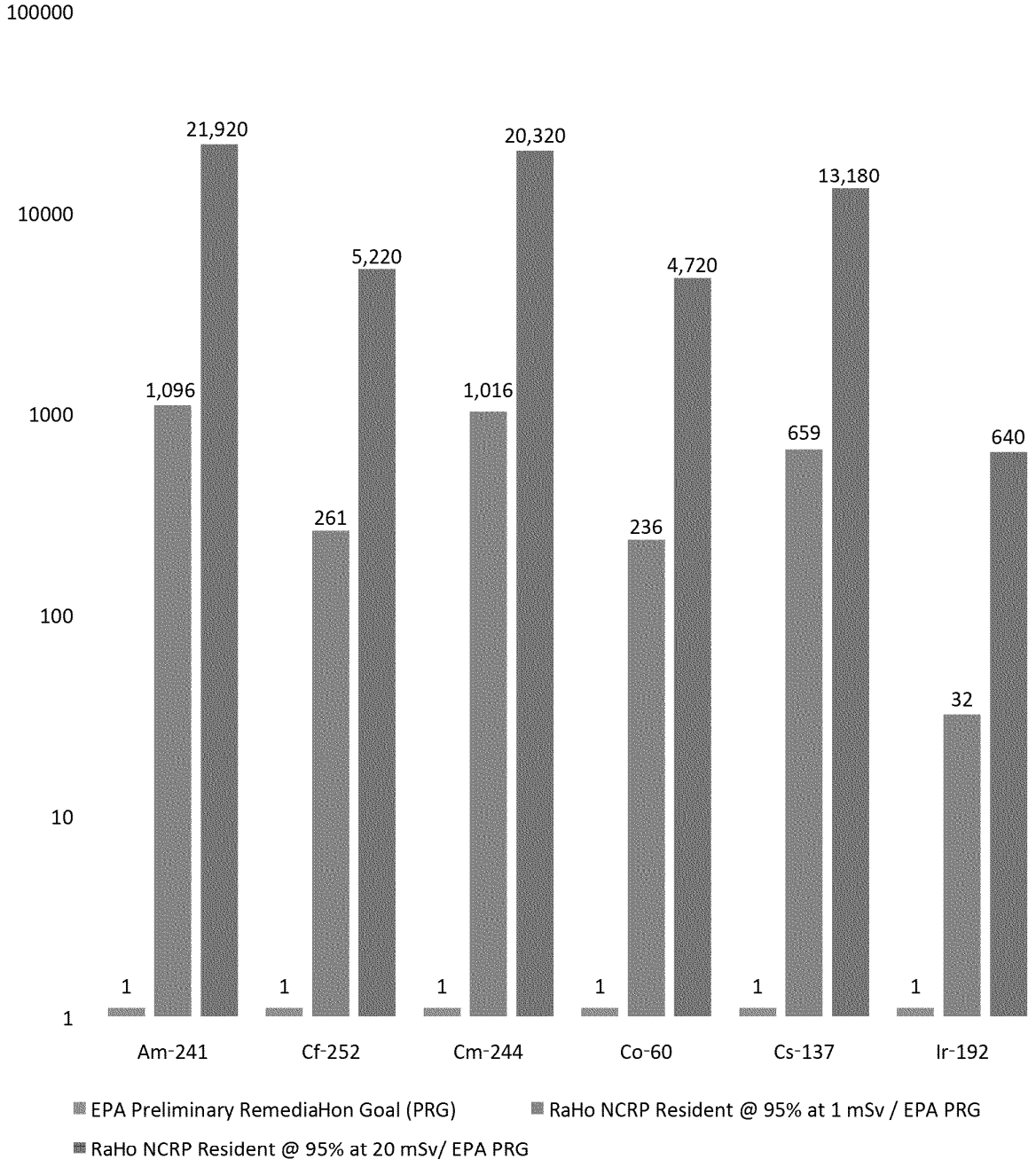


FIGURE 3b

How Many Times More Radioac2vity Would be Permi : ed in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 95% Confidence Level)

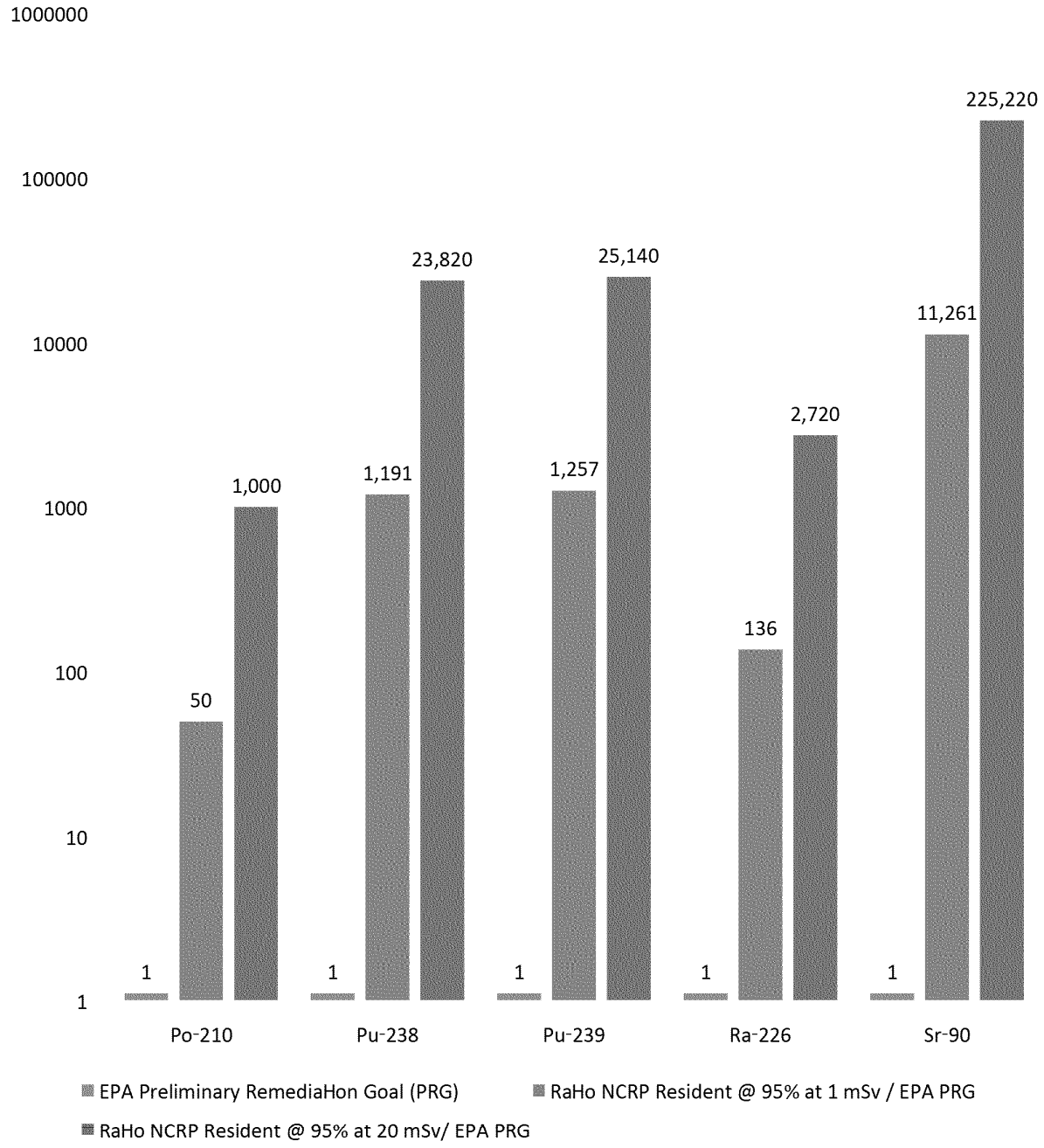


FIGURE 4a

How Many Times More Radioac2vity Would be Permi : ed in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 50% Confidence Level)

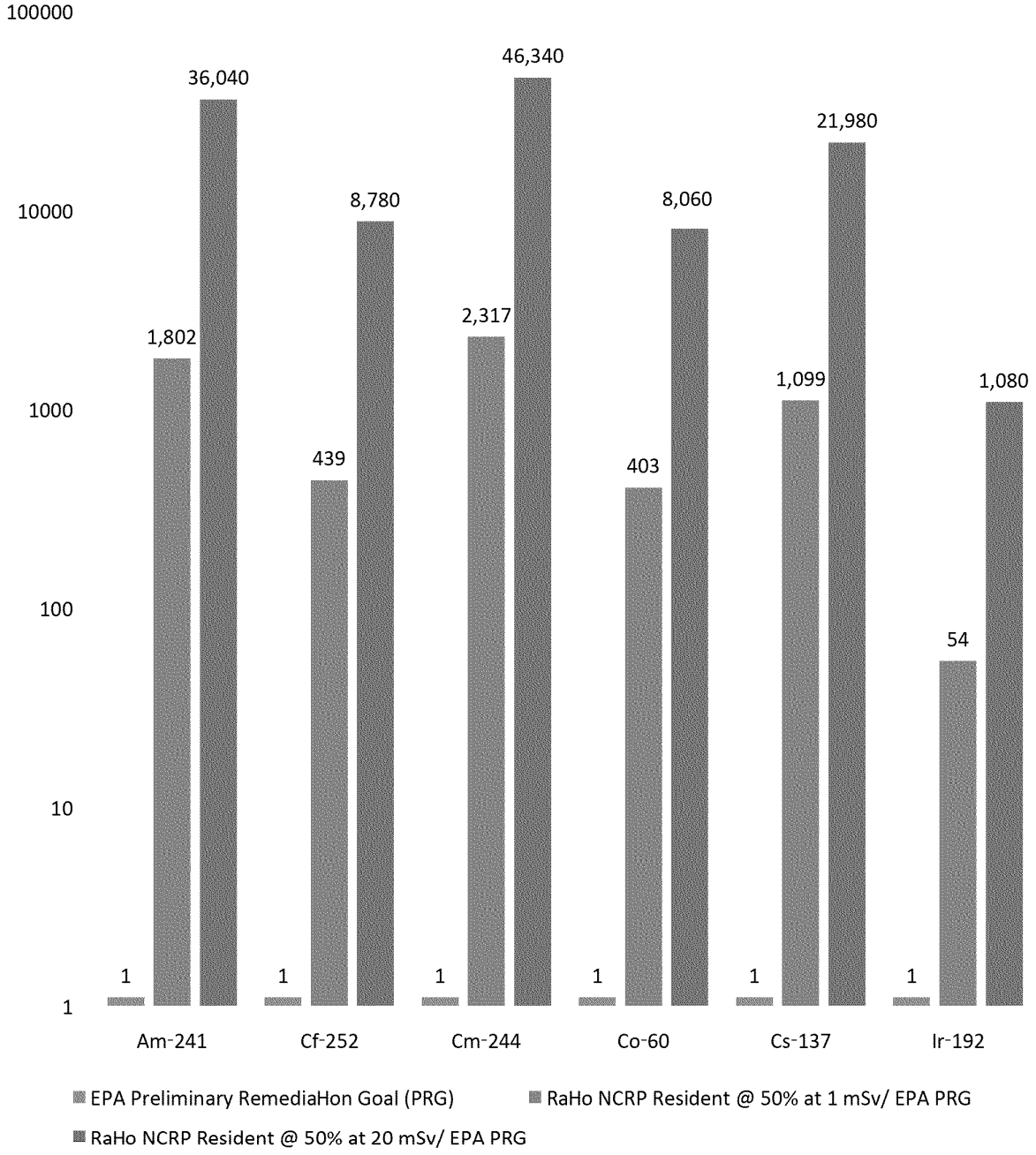


FIGURE 4b

How Many Times More Radioac2vity Would be Permi : ed in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remedia2on Goals

(@ 50% Confidence Level)

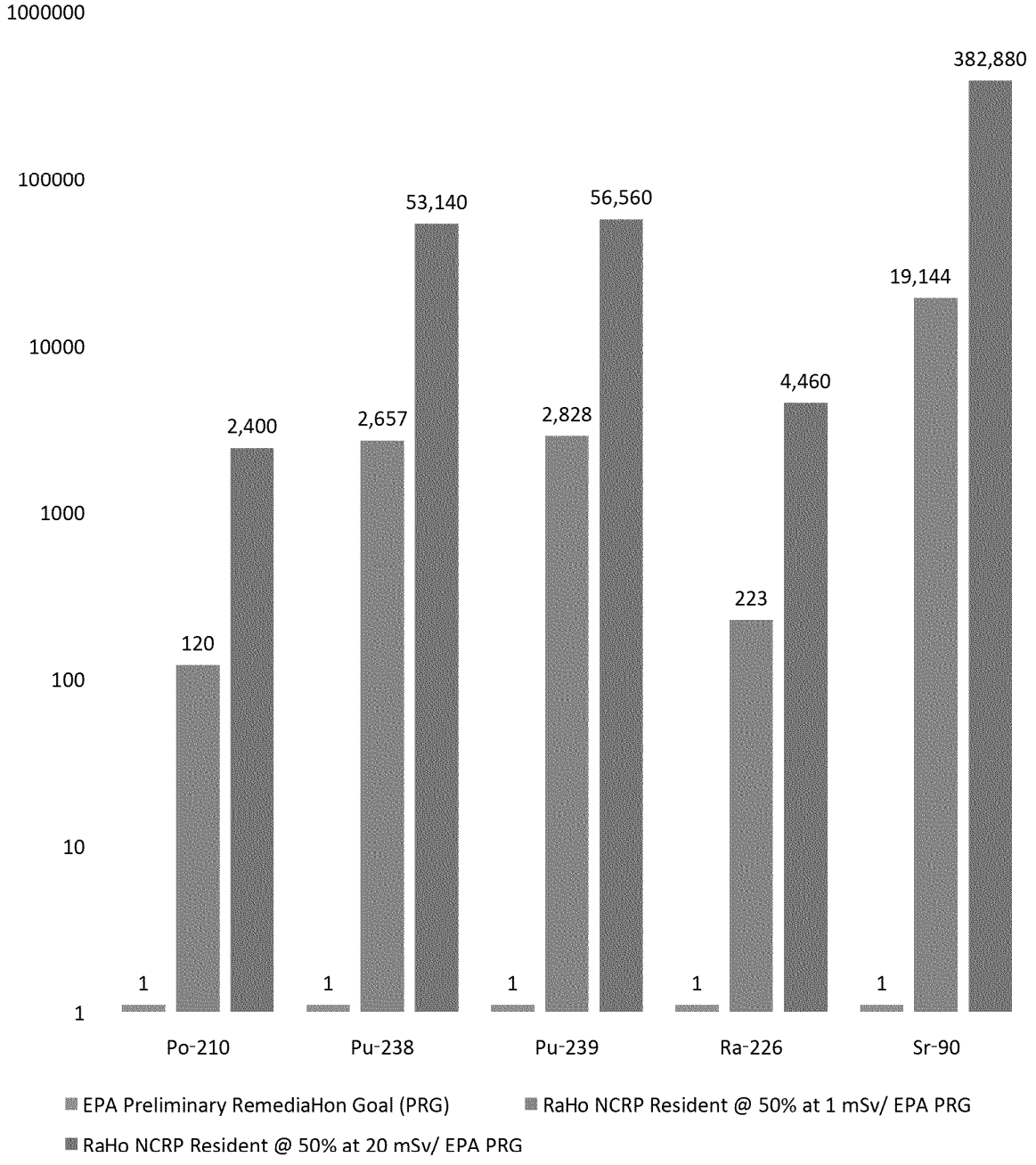


FIGURE 5a

Comparison of NCRP Proposed Permissible Concentra2ons of Radioac2vity in Farmer's Soil in Bq/g Compared to EPA Remedia2on Goals

(log scale)

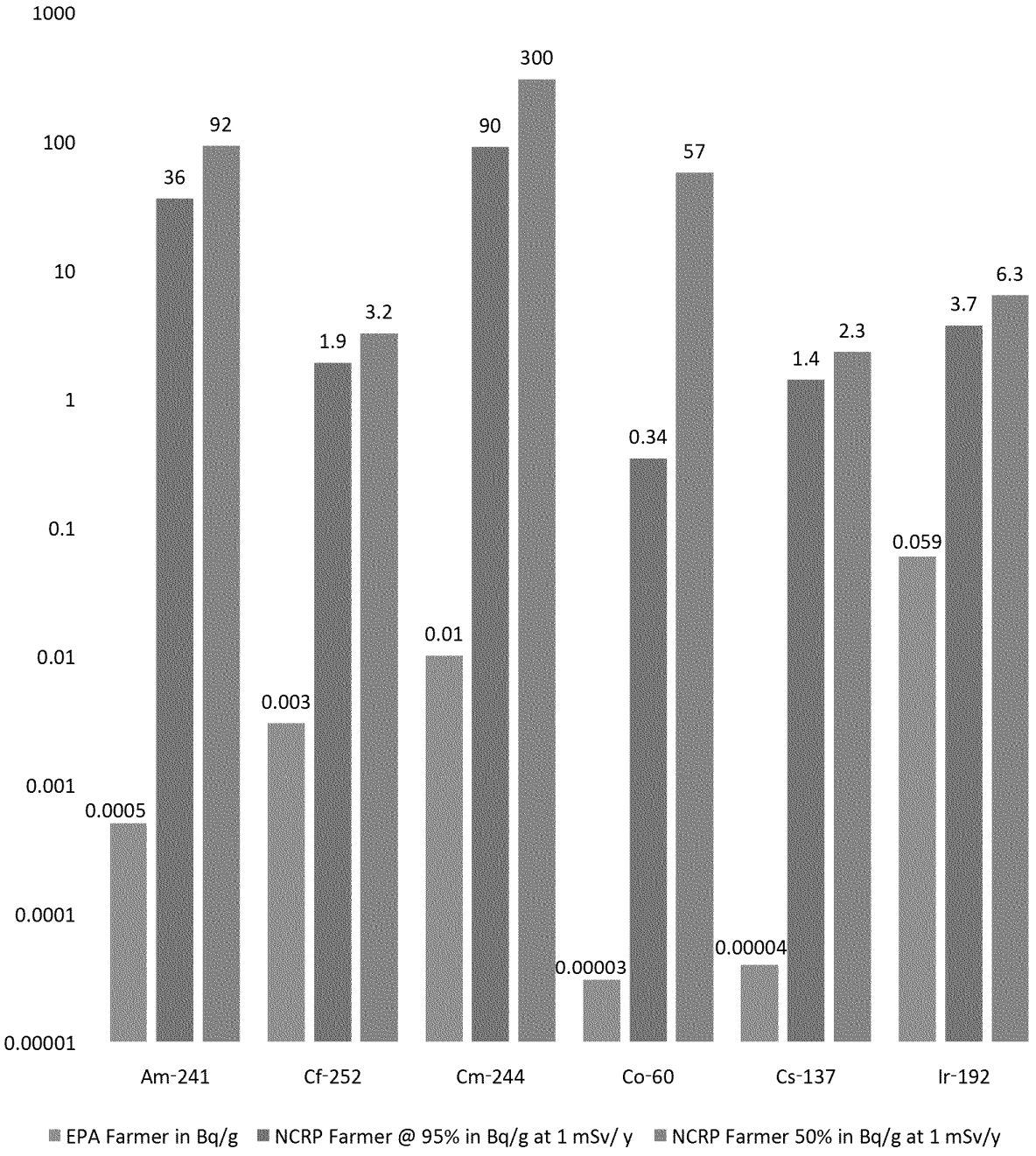


FIGURE 5b

Comparison of NCRP Proposed Permissible Concentra2ons of Radioac2vity in Farmer's Soil in Bq/g Compared to EPA Remedia2on Goals

(log scale)

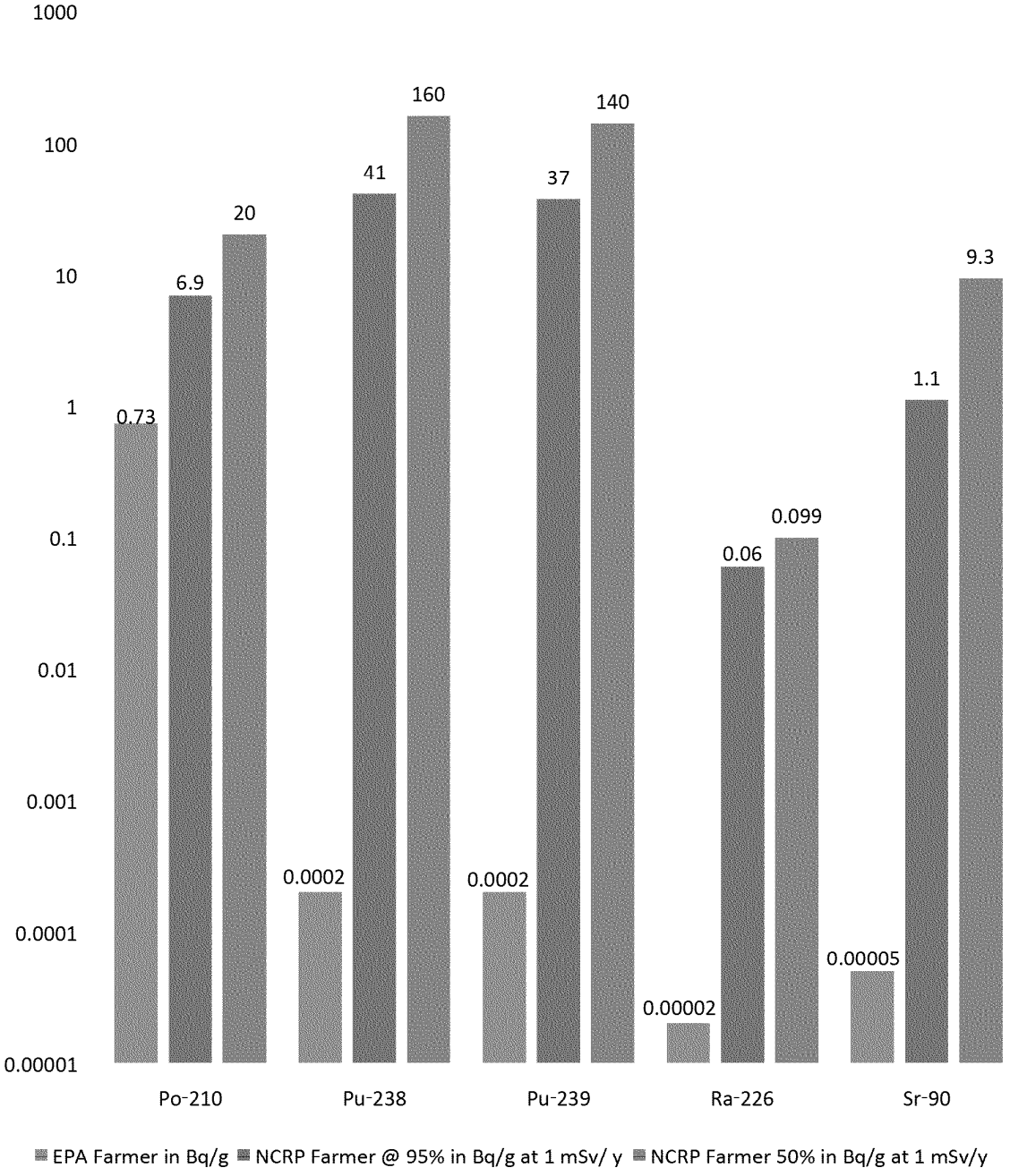


FIGURE 6a

Comparison of NCRP Proposed Permissible Concentra2ons of Radioac2vity in Resident's Soil in Bq/g Compared to EPA Remedia2on Goals

(log scale)

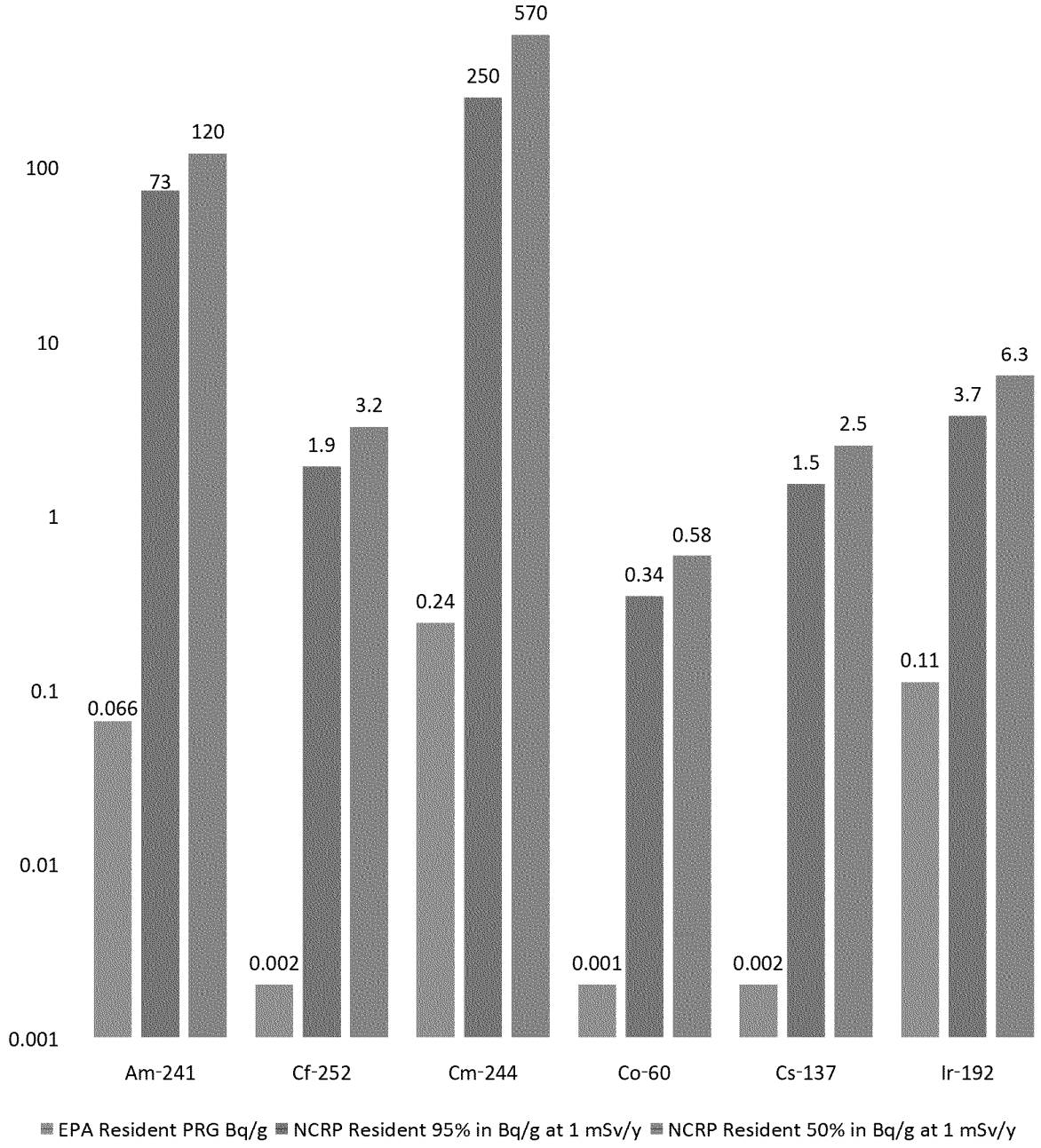
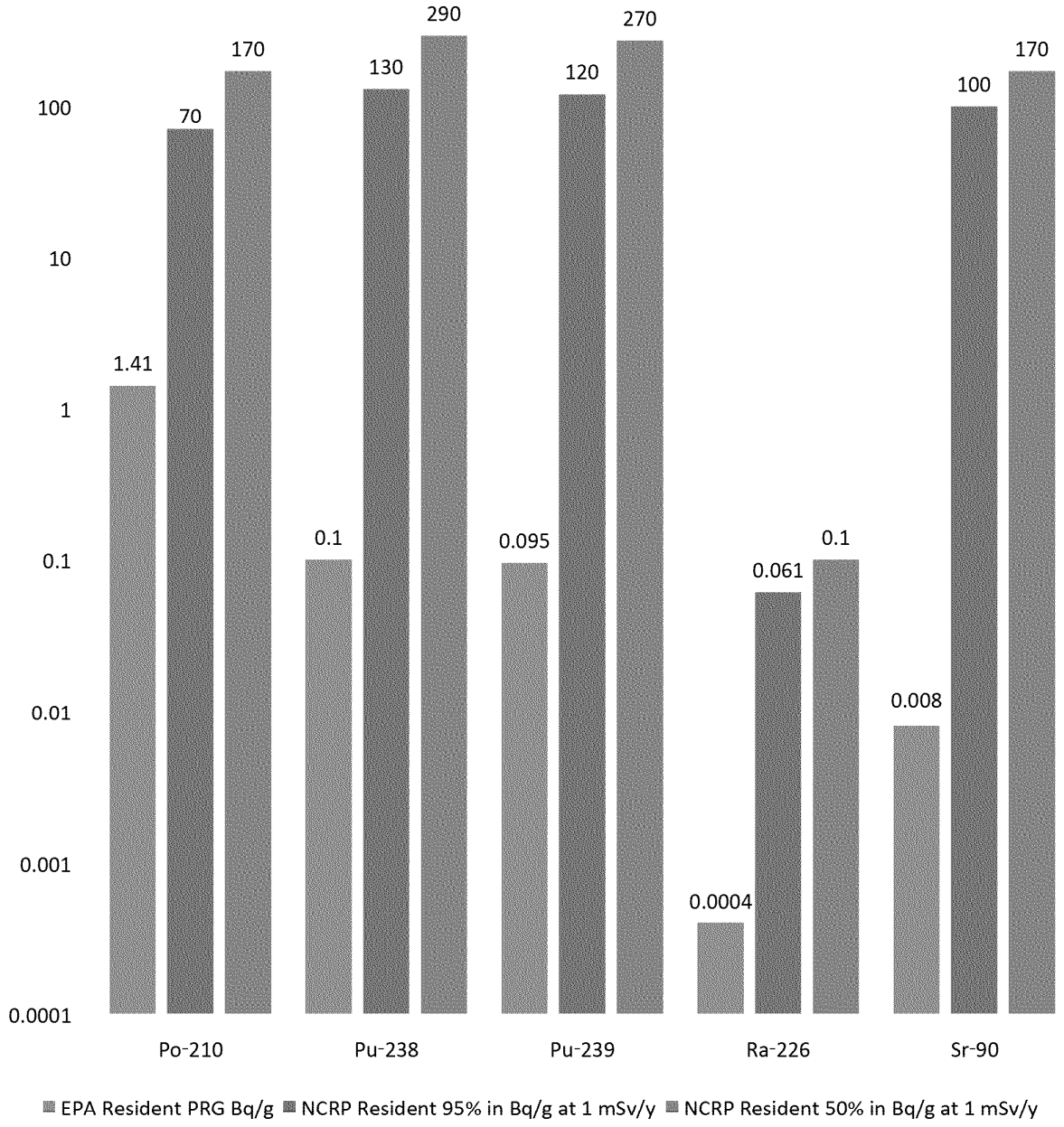


FIGURE 6b

Comparison of NCRP Proposed Permissible Concentra2ons of Radioac2vity in Resident's Soil in Bq/g Compared to EPA Remedia2on Goals

(log scale)



16 September 2013

EPA Draft PAG Manual Comments

Per the Federal Register announcement of 15 April 2013, and extended on 15 July 2013, the following comments are respectfully submitted:

1. ICRP-60

I fully concur with the EPA adoption of FRMAC calculation methodology, updated using ICRP-60 principles. This represents real progress, aligning the primary responding federal agencies for a radiological event to all share the same technical assumptions, based on the most up-to-date scientific consensus.

I also both hope and recommend technical outreach and training is extended to states, reflecting these changes, sharing this technical understanding and deepening state-federal coordination.

2. What is a PAG?

I would like to share my opinion that the next revision, or iteration, of the PAG manual would benefit from an expanded discussion of what a PAG is and is not.

On the first page of the Draft Manual, it states clearly that PAGs are not meant as "strict numeric criteria" and do not "represent the boundary between safe and unsafe conditions". Elsewhere in the Manual are references to "unavoidable dose". These distinctions are clear to those of us in a technical program area, and who have read EPA-400-R-92-001 multiple times.

These nuances are lost on most planners and decision makers, and represent a tremendous communication challenge to the general public. If an evacuation is ordered at a projected dose of 1 rem TEDE, a logical conclusion would be because there are health consequences making it unsafe. If I must relocate at a projected 2 rem dose in the 1st Year, and not at a projected 1.99 rem, it's hard to see this interpreted as other than a safe-unsafe line.

This represents one of the greatest risk communication challenges for a radiological incident, and how PAGs would be used. I would like to see the PAG Manual acknowledge and address this in greater depth. The use of PAG values is to drive the development of Protective Action Decisions. In this perspective, the public health benefits must inevitably be balanced and against the economic and societal impact costs, and other important factors. I would like to see the PAG Manual acknowledge and more fully discuss this in the future.

3. Elimination of the Thyroid PAG

One particularly interesting aspect of the Draft PAG Manual concerns the Thyroid PAG. Currently within the REP Program, a projected thyroid CDE dose of 5 rem would trigger evacuation or shelter-in-place recommendations. This has been changed in the 2013 PAG Manual (table 2-1, page 15) to instead trigger a recommendation only for the public to take KI.

Implementing this change on a state level presents two primary challenges. The first lies in messaging. If formerly 5 rem thyroid CDE would warrant an evacuation order, but not now, this implies a less protective standard. Can better technical understanding, which downgrades the health risks, explain this?

As actions change for specific numerical values, greater explanation is required; the PAG Manual needs to better address the technical basis for these changes. While the PAG Manual confers no legally binding requirements to prevent us from continuing to evacuate the general public at a projected 5 rem thyroid CDE dose, which is the most scientifically defensible course of action?

The second challenge is a very practical one. In our state all residents in the 10-mile EPZ annually receive a planning guide, which includes a voucher for a box of KI at an area pharmacy chain. While 100% of residents receive these vouchers each year, only 1-2% of these are ever redeemed. In our current messaging, the KI recommendation is always embedded (e.g., evacuate and take KI, shelter and take KI). Issuing a separate "take KI" only message would be impractical. Essentially we would be telling people to take something they had a chance to get, most likely didn't, and now can't get.

I do not dispute eliminating the thyroid or skin PAGs but greater discussion of the technical bases, explaining these changes, is needed.

4. Elimination of the 50-Year Relocation PAG

I fully support the elimination of the 5 rem 50-year Relocation PAG. Averaging 100 millirem per year, this easily falls within the variance of annual background doses within the United States, and does not represent a radiological health risk.

This is an example where a very minimal dose would trigger economic and societal impacts out of proportion to any benefit. Eliminating this is an excellent decision.

5. Emergency Worker Dose Levels

On page 26 of the Draft PAG Manual, it states the following:

"Emergency responders undertaking mission covered under the response worker guidelines should be informed when radiation control measures may not prevent doses from exceeding the 5 rem (50 mSv), general occupational exposure guidelines and should be made fully aware of the sub-chronic and chronic risks involved, including numerical estimates of the risk of delayed health effects."

Interestingly, page 2-11 in EPA-400-R-92-001 states:

"However, persons undertaking any emergency operation in which the dose will exceed 25 rem to the whole body should do so with full awareness of the risks involved, including the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects."

So in the 1992 PAG Manual, responders potentially receiving more than a 25 rem dose had to receive numerical estimates of chronic and non-chronic risks, whereas in the 2013 draft any worker potentially receiving more than 5 rem must receive the same. Why?

This is particularly interesting when, in the 2nd paragraph of page 27 in the Draft PAG Manual, it states that the estimated fatal cancer risk for workers exposed to 10 rem is slightly less than the general population risk.

The Draft PAG Manual does a good job in presenting acute risks in Table 2-3 on page 27. What it needs to present more clearly with an accompanying chart are numerical cancer risk estimates at 5 rem, 10 rem, 25 rem, and above. If these are the response worker guidelines (Table 2-2 on page 26), what are the numerical risks to communicate to responders?

EPA-400-R-92-001 provides such a chart for a 25 rem TEDE dose in Table 2.4 on page 2-12. This is discussed further in the Appendix C in the 1992 PAG Manual, but is missing from the 2013 version. Updated information regarding the statistical risks for delayed health effects at different dose levels should be incorporated into the 2013 PAG Manual.

Ultimately these are not simple issues: the biological effects of low doses, and whether the linear no-threshold model applies. Still, if responders need to be briefed of health risks at doses below 25 rem, this is information and discussion the PAG Manual should provide.

6. Sheltering-in-Place

The Draft PAG Manual would benefit from a more in-depth discussion of the dose reduction factors provided by sheltering. Currently this is only represented in Figure 2-1 on page 19, through a picture from the IND guidance document showing exposure reduction from nuclear fallout.

For example, what dose reduction does sheltering offer for a nuclear plant accident scenario? What sheltering conditions exist for a RDD scenario (e.g., if building ventilation systems aren't promptly shut down, airborne concentrations inside buildings could become greater than outside)? A bulleted point on page 33 of the 2013 PAG Manual reads "sheltering-in-place should be preferred to evacuation whenever it provides equal or greater protection". What guidance exists to evaluate this decision in terms of dose?

Sheltering is an important and viable protective action for a radiological incident. Greater guidance should be developed to provide shelter dose reduction estimates for planners and assessors. Guidance on the most effective sheltering practices would also be on benefit to the general public, incorporated into messaging and outreach. It seems there is an appropriate place for an expanded discussion of this in the PAG Manual.

7. Pregnancy

A notable difference in the Draft PAG Manual from EPA-400-R-92-001 is in how infrequently pregnancy is mentioned. The only mentions in the draft manual are on pages 19-20, in reference to KI.

This is quite different from the 1992 PAG Manual. While it is clear there is no separate PAG for pregnant women (C-20), multiple times it raises considerations regarding pregnancy, relocation, and decontamination prioritization (4-3, 4-6, 7-6, 7-17). The 1992 version also advises that the assignment of emergency worker missions "should be limited to nonpregnant adults" (page 2-10).

On page B-18, the 1992 PAG Manual presents the IC-77 recommendation controlling exposure of the fetus to less than 0.5 rem in the first two months. Page E-11 continues along this line of thinking, stating "women who are less than seven months pregnant may wish to relocate for the balance of their pregnancy if the projected dose during pregnancy cannot be reduced below 0.5 rem". The 2013 Draft PAG Manual has sections on dose projection and establishing isodose-rate lines in its relocation section, but no mention of these pregnancy public health concerns.

It is almost certain for any radiological incident that the general public will be very concerned, pregnant or lactating women among the most concerned. I am unclear why these considerations were dropped in the 2013 PAG Manual.

8. Protective Action Guidance for Food and Drinking Water

I recognize the difficulties in developing a drinking water PAG, or DIL, and support the development of a technical resolution for this issue.

I also applaud the inclusion of section 3.5.3, and the discussion of different corrective action options to reduce contamination in the drinking water supply. This is an interesting addition to the PAG Manual, and of legitimate preparedness concern.

I would welcome and expanded technical discussion of these topics in an appendix to the PAG Manual.

9. Guidance for the Late Phase

I also commend the expanded discussion of Late Phase issues in Chapter 4 of the draft PAG Manual. As stated in the key points found at the end of this chapter (page 69), "safely managing and disposing of radioactive waste will require pre-planning at all levels of government and careful coordination with stakeholders at all stages of the decision-making process." I am optimistic the inclusion of this section can serve to catalyze this pre-planning.

Recovery after a radiological incident is rightfully described in the PAG Manual as a flexible and iterative process. That said, this section avoids any mention of remediation dose levels. Late Phase decision making must address cost, public perception, and public health. Some numerical clean-up guidelines should exist for state and local stakeholders, targeting and helping to project budgets for remediation goals. There is just not the expertise at the state and local level to determine the public health concerns in remediating down to 100 millirem/year, 200 millirem/year, or 499 millirem/year. EPA-400-R-92-001, in Appendices C and E, had several sections identifying cost assumptions and cost/risk considerations. This would be very relevant to update and include in the Late Phase section of the current PAG Manual.

The discussion of waste disposal options, a new inclusion, is also highly appropriate and relevant. In future versions, I would also like to see some discussion of remediation strategies for agricultural land.

This entire Late Phase section could also be discussed in greater technical depth as an appendix to the PAG manual, particularly as costs, impacts, and lessons learned are identified following events in Japan.

10. Overall Comments

EPA-400-R-92-001 was primarily a REP Program document, designed around source terms for a nuclear generating plant accident. The newer PAG Manual attempts to be applicable to a wider range of radiological scenarios. This is laudable.

While this is an excellent effort, one criticism is this recent iteration of the PAG Manual is shorter and far less technical than EPA-400-R-92-001. Like many, I learned a great deal reading the 1992 PAG Manual, and appreciated its numerous documented technical references, representing the best scientific understanding regarding radiation, risk, and dose. I would like to see the PAG Manual in the future recapture this technical perspective.

These comments are submitted in the interest of greater collaboration and state-federal partnership. It is my sincere hope they are helpful in developing a better document, more effectively protecting the public, and building our overall national resilience.

Sincerely,

Brennen Brunner
Principal Planner, Radiological Emergency Preparedness Program
Minnesota Homeland Security and Emergency Management

Bureau of Environmental Health
1000 SW Jackson, Ste. 330
Topeka, KS 66612-1365

Kansas

Phone: 785-296-1560
Fax: 785-296-0984
tconley@kdheks.gov

Robert Moser, MD, Secretary | Department of Health & Environment | Sam Brownback, Governor

September 16, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code 6102 T
Pennsylvania Ave
NW Washington DC, 20460
Attn: Docket ID No EPA-HQ-OAR2007-0268

The Kansas Radiation Control Program has performed a review of the 2013 draft of the "PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents". The Kansas Radiation Control Program believes the efforts of the EPA to revise the current PAG Manual are a positive step. To the extent possible, we have attempted to provide comments on the specific issues that were requested in Section E of the Federal Register Notice. However, we have some generic comments that apply to the entire document that we feel should be addressed before this new manual is considered final.

The title of the PAG Manual is "Protective Action Guides and Planning Guidance for Radiological Incidents". The first three chapters are clearly focused on the basis for the PAGS, the numerical values to compare projected doses to, and the actions that should occur. The fourth chapter focuses more on planning guidance and does not include much in the way of PAGs. Therefore, we feel that the title of the fourth chapter should be changed to "Planning Considerations for the Late Phase" instead of "Guidance for the Late Phase".

We feel that referencing the 1992 version of the PAG manual is detrimental to the purpose of the new manual and could lead to confusion. When the new version of the manual becomes final, it should completely replace the old version. Sections of the old PAG manual that are still applicable should be contained in the new PAG manual. In addition we feel that some of the references have not been updated that should be. An example of this is the reference to the Reactor Safety Study in section 2.4.2. This section should be updated to reference current understanding of reactor accidents as discussed in NUREG-1935, the SOARCA Report.
On a final note we would like to see the new EPA PAGs adopted eventually as Presidential Guidance. As this will take additional time we also recommend that the new EPA PAGs are not held up while this Presidential Guidance is sought.

Thank you for considering these comments and requests. Kansas stands ready to assist our Federal partners and are available to provide additional details on any of these issues should you desire. I look forward to your response.

Sincerely,

Thomas Conley, CHP
Chief, Radiation Control Program
Kansas Department of Health and Environment

ATTACHMENT 1

SPECIFIC COMMENTS SOUGHT BY EPA
Manual of Protective Action Guides

1. To implement the PAGs, the reader is referred to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals. The Assessment Manuals are updated with current International Commission on Radiological Protection (ICRP) dosimetry models (i.e., ICRP 60 series) and dose coefficients. The FRPCC also encourages the use of computational tools such as DOE's Turbo FRMAC, RESRAD RDD and NRC's RASCAL or other appropriate tools and methods to implement the PAGs. We request comment on the usefulness of this approach and seek feedback on how to facilitate implementation of these methods in emergency management plans.

We understand why EPA has chosen to recommend the use of computational tools such as Turbo FRMAC and RASCAL to calculate values to be compared to the PAGs. While in basic agreement with this concept it should be made clear that there may be a slight difference in results depending on which model is used.

The 1992 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400–R–92–001, May 1992) contained tables and charts that provided Dose Conversion Factors and Derived Response Levels for various radionuclides along with formulas for calculating these values. The FRMAC Assessment Manual and their Turbo FRMAC program for dose assessment do not use these terms in the same manner as the original document. The updated guidance should use terminology consistent with FRMAC, or refer to their methods and tools generically as "the most current DOE/FRMAC Assessment Tools". Further, the table and charts found in the 1992 version of the PAG Manual were useful for state assessment staff as a quick reference guide. Lacking these tables and charts, it would be useful to have a single repository for all the tools available for accident assessment for various radiological accidents. Currently, Turbo FRMAC is distributed and updated through distribution of CDs to licensed organizations. RESRAD RDD is available but (from my understanding) has issues running on some IT platforms that states use.

We suggest that EPA, in conjunction with the FRPCC, consider developing web access to radiological assessment tools and reference material so that the most current versions and updated documents and guidance are accessible in a "onestop" format. It would also be extremely beneficial for the assessment tools to be web based so that distribution and updates are no longer necessary. This would allow all states to access the most current version of tools, documents and guidance that are necessary for the assessment of all types of radiological accidents, i.e. NPP, RDD, IND. It would ensure the consistent application of assessment principles and would facilitate updating methods over time as changes are made to dose calculations models (i.e. RASCAL, TurboFRMAC), dosimetry models (i.e. ICRP guidance) and other documents that would affect the calculations for radiological dose.

2. The Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, a drinking water PAG is being sought.

The Committee recommends that the final version of the PAG manual have guidance for drinking water. It is critical for situations where there are no reasonable alternative water supplies for the short term, the drinking water supply contains radioactive materials that would exceed Safe Drinking Water Standards, access to drinking water is crucial to public health, and relocation/evacuation is not feasible at that point in time. Part of this discussion should include the evaluation and consideration of the Department of Homeland Security Document, Planning Guidance for Protection and Recovery Following Radiological Dispersal Device and Improvised Nuclear Device Incidents. Interestingly, this document, issued in 2008, includes a PAG for water,

Table-1, at 0.5 Rem (0.005 Sv) projected in the first year. The document states that "These values are consistent with those now used or being considered as PAGs for other types of nuclear/radiological incidents. Further, the DHS document states:

"By agreement with the Environmental Protection Agency (EPA), the Guidance being published today is final and its substance will be incorporated without change into the revision of the 1992 EPA Manual of Protective Actions Guides and Protective Actions for Nuclear Incidents (the PAG Manual). This notice of final guidance will therefore sunset upon publication of the new EPA PAG Manual (see, http://www.epa.gov/radiation/rert/pags.html). The reader will then be directed to the new EPA PAG Manual, where these provisions may be found."

It is unclear where the updated PAG guidance brings us regarding the PAG for Drinking Water. The guidance was not adopted as written (as stated in the DHS document) and the DHS guidance has sunset according to the language cited above. This leaves no recognized basis for establishing a drinking water intervention level other than those in the Safe Drinking Water Act. We do not believe that these threshold values are practical for application during significant radiological emergencies where there is widespread contamination of the drinking water supply. The 4 mRem threshold used for drinking water standards is based on multiple assumptions that include a 70-year committed dose from consumption. This is not a reasonable assumption for application during an emergency.

The EPA has provided a number of alternatives for drinking water supplies during emergency conditions that provide a means for reducing and/or avoiding dose. Recommendations should be made to consider these options and their feasibility for implementation prior to consideration of intervention levels for drinking water above the safe drinking water standards. However, if the public health risk of not having a water supply is greater than the risk of the dose received from drinking slightly contaminated water, then alternative drinking water intervention levels should be established for the short term until an acceptable water supply can be made available.

The parameters for this decision and the intervention level should be based upon the current guidance that FDA provides for food and milk combined with those established by DHS for IND/RDD events. For the Intermediate Phase, we suggest that water be included in the dose consideration for the ingestion pathway as a single value of 500 mRem per year (provided that alternative water supplies are not available or feasible). That should be the upper bound of exposure from the ingestion of food, water and milk combined. Water should not be treated as a separate exposure pathway since water is a key component of diet in many ways and cannot actually be separated. During this period, the supplier shall attempt to locate and supply water that will be in compliance with the Drinking Water Standards. Water used for the production of food stuffs shall result in food levels not exceeding the FDA DILs.

It should also be noted that any intervention level set is for interim use only, and every reasonable and feasible action should be taken to ensure that drinking water supplies for the public are brought back to an acceptablelevel or "normalcy" as soon as reasonably achievable.

3. The most substantive PAG change in the Early Phase is the 2001 guidance from the FDA that lowers the threshold for administration of potassium iodide (KI) to the public from 25 rem projected adult thyroid dose to 5 rem projected child thyroid dose. Chapter 2 includes a streamlined implementation scheme based on FDA's guidance. Please comment on the usefulness of this simplified guidance in the text of Chapter 2.

Kansas has several comments about section 2.3.4.

The decision to stockpile and distribute Potassium Iodide (KI) to the general public during a nuclear emergency is a state and local government decision. There are some states that stockpile and pre-distribute, others that

stockpile and distribute through Reception Centers and others that choose not to stockpile at all. The FDA provides guidance that discusses in detail the intervention thresholds and dosages for each specific age group. In this sense, the prophylactic use of KI is not a public Protective Action per se but a supplemental action that state and local decision makers use according to the plans and procedures in place.

The new EPA PAG Manual has not only referenced the 2001 FDA guidance on KI but also reproduced certain sections of the document. We understand the need to simplify the guidance for issuing KI but it is important to not leave out the dosing information for KI that was contained in the 2001 FDA guidance. It is recommended that the PAG Manual be simplified by referencing the 2001 FDA recommendations for KI and omit the proposed excerpts from the guidance. Additionally, some states do NOT recommend KI to the public. Therefore, we agree with listing KI as a supplemental protective action.

4. The skin and thyroid evacuation thresholds were removed to avoid confusion with the KI threshold. The skin and thyroid doses were 5 and 50 times higher, respectively, than the 1 to 5 rem whole-body dose guideline. Please comment specifically on the appropriateness of not retaining the skin and thyroid evacuation thresholds.

Some states wish to continue to use a Thyroid PAG as they do not currently issue KI to the public. Therefore we recommend including language in the document that states may continue to use a Thyroid PAG for evacuation or shelter if they wish to add this additional PAG to ensure the public health and safety is protected in all possible scenarios.

5. The most substantive PAG change in the Intermediate Phase is the removal of the 5 rem over 50 years relocation PAG which was potentially being confused with long term cleanup. Please comment on the appropriateness of this change.

We feel that the removal of the long term PAG of 5 Rem is appropriate. Consideration out to 50 years should be part of the late phase/clean up criteria, not part of an intermediate phase PAG.

6. **As an extension of the PAGs, new guidance on reentry to relocation areas is provided to inform plans and procedures to protect workers and members of the public as the Intermediate Phase progresses. Please comment on the format and utility of this material**.

We feel that additional guidance on reentry is beneficial. However, the current format and content could be enhanced. The current guidance should include not only total dose that the individual should not exceed, but also provide guidelines on exposure rates, site specific conditions, and environmental conditions that should be considered before authorizing permission for reentry.

7. **Please comment on whether it would be useful to develop a new, combined Intermediate Phase PAG considering all exposure pathways to potentially simplify decision making**.

We agree with keeping the relocation PAG separate from the food PAG because the required actions to implement are so different (moving people vs. embargoing food products). However, as noted earlier, we believe that it would be beneficial to include drinking water in the estimation of ingestion pathway food and milk PAGs not to exceed a 500 mRem dose in the first year.

8. A brief planning guidance on the cleanup process is included. Please comment on the usefulness of this information, as well as how it might best be implemented in state, tribal and local plans.

This material might be better suited for an appendix. By making the guidance more of a checklist format it may also be more useful.

9. **A suggested process and organization for approaching the late phase cleanup is provided from the 2008 RDD-IND Planning Guidance. Please comment on the merging of that guidance with the 2013 PAG Manual**.

We feel strongly that the new EPA PAG Manual needs more definitive guidance for State planners on how to implement the cleanup process. The material presented in Chapter 4 of this document and the DHS RDD-IND Planning guidance provides a "theoretical" approach to a systematic process for evaluation of long term impacts, what considerations need to be made and what stakeholders need to be involved in the process. All this information is useful for setting up the process. However, as a technical document, the EPA PAG Manual provides no guidance, references or tools to perform the technical assessment of key parameters required for decision making. That is, there is no actual guidance for the practical implementation of the process. For example, there is no method or tool identified to evaluate comparative risk for various clean-up standards. Is there a tool to assist with evaluating the risk between a 100mRem, a 50mRem, and a 25 mRem clean up standard? There is no tool or method identified in the document to assist with the evaluation of the amount of waste generated from different clean up options. Using the above example, it is imperative that decision makers understand how choosing a lower clean-up threshold affects waste generation and disposal costs. Is there a tool or method that can be used to estimate these values?

A suggestion would be to provide a toolkit, guidance or references which would provide a means to calculate parameters such as cost and volume of waste based on cleanup standards. One of the problems associated with the optimization process is that for large incidents there could be adjacent geopolitical areas that have established different clean-up standards. This will lead to confusion and possible litigation. It is imperative that there be some standards established ahead of time that states can reference in order to promote consistency in the process for decision making.

10. Basic planning guidance on approaching radioactive waste disposal is included. Please comment on this material and how it should be implemented in emergency response and recovery plans at all levels of government.

It is inappropriate for the guidance to state that the consideration and disposal of waste generated through cleanup efforts following a significant radiological event is a state and local decision and consideration. Based on the data made available from the Fukushima accident and considering the available waste storage capacity in the United States, it is unreasonable to think that state and local government agencies would be able to address this significant issue without assistance from the federal government.

Further, nuclear power plants are licensed by the NRC and states have little to no regulatory authority over radioactive materials, reactor fuel and spent fuel. Long term storage and disposal of high level radioactive waste from fixed nuclear facilities is the responsibility of the DOE. Weapons material and waste is a responsibility of the DoD and therefore, any contaminated waste generated by the use of an IND ought to be the property and responsibility of the DoD. Material and waste generated as part of a terrorist act may be considered evidence subject to control by federal law enforcement agencies. In evaluating the regulatory agencies and authorities for radioactive materials, it is inconceivable how EPA can consider radioactive waste solely a state and local issue.

In the United States, there is a significant issue regarding long term radioactive waste storage and the construction of a suitable site for a high level radioactive waste repository. Further, current storage facilities that accept low level radioactive waste have severely limited capacity in light of the waste that would be generated by a large scale nuclear event. With these considerations in mind, it is unreasonable to think that state and local governments would be able to site, construct and license a radioactive waste storage facility within state borders in sufficient time to be effective for the response. For states with high population densities, it may very well be impossible to site such a facility at all. For large radiological events, it is likely that contamination will cross jurisdictional boundaries between states and perhaps even international borders. As

one example, an Improvised Nuclear Device could be detonated by international terrorists and affect multiple states. The Kansas Radiation Control Program believes that the Federal Government bears the responsibility of protecting national security and as such bears the responsibility for waste disposal that would result from such acts.

A large release could lead to low level waste volumes that are impossible to store realistically. Standards need to be developed that ensure that the amount of low level waste generated can be accommodated at existing low level waste storage facilities. The states are not looking for theoretical solutions but practical and realistic solutions. The waste issue cannot be adequately addressed until cleanup criteria and disposal facilities are balanced. The EPA needs to have a more realistic approach to radiological waste disposal that identifies the resolution to the problem and establishes the challenge of radioactive waste disposal/management from a radiological disaster as a joint federal, state and local responsibility.

ATTACHMENT 2

ADDITIONAL COMMENTS FROM THE KANSAS RADIATION CONTROL PROGRAM
Manual of Protective Action Guides

Chapter 1

1. Table 1-1. Planning Guidance and Protective Action Guides for Radiological Incidents

The Early Phase of this Table lists the administration of prophylactic drug KI as a Protective Action Recommendation. The decision to stockpile and distribute KI to the public is a state and local decision and not all jurisdictions have decided to provide KI as part of their response. In order that the Administration of KI is not confused with other Protective Action Recommendations, it is recommended that it be considered a supplemental action for the public and not listed within this table. However, if the intent here is for the protection of emergency workers, it should be stated as such.

2. Page 9, 4th Paragraph

…(as in the case of an accident at an NPP)…

Changed to

…(as in the case of an accident at a NPP)…

3. Page 9, 4th Paragraph

The discussion of the late phase of an emergency introduces new terminology to the EPA document. The term "Reoccupancy" is introduced to describe what has been referred to in the past as "Return". If it is the intent of the EPA to introduce this term as the acceptable language for that action, it should be noted in **BOLD** and included in the glossary. It should also be noted within the text what term it will be replacing for clarity.

4. Page 9, Last Paragraph

The EPA is seeking input on the appropriateness of developing a short-term emergency water PAG. In Attachment 1 of this document, the we provided discussion regarding the development of a drinking water PAG. It would be appropriate to include that discussion here in the document and remove the final paragraph if the EPA accepts the suggestion.

5. Page 10, First Paragraph

The discussion within this relates to the National Primary Drinking Water Regulation. The regulatory standard of 4mRem/year based on lifetime exposure is provided. It would be of greater value to have the assumptions for the standard more clearly defined here so that decision makers can better understand the application of this standard. It should clearly state here or, if appropriate, in other sections related to drinking water exactly what time frames (70 years) consumption (liters per day), mitigation strategies (none) etc. are used to calculate that value.

6. Page 10, Final Paragraph

The discussion of the late phase includes the following statement:

"The cleanup process described in Chapter 4, however, does not rely on and does not affect any authority, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq. and the National Contingency Plan (NCP), 40 CFR Part 300."

The intent and interpretation of this statement is unclear. Should we assume that, if during the late phase, a state chooses a clean-up value that is greater than the CERCLA standards, that EPA would exercise its authority to block this action? The intent of this statement needs to be more clearly defined.

Chapter 2

1. Page 16, Section 2.3.1

Spelling question. There are two different spellings within the paragraph for the same word: colocate and collocate. EPA can decide what is best but for the meaning and intent of the discussion it is found, co-locate would likely be the best spelling.

2. Page 17, Section 2.3.2

While the general discussion provides good information, the NRC/FEMA released an updated version of NUREG-0654, Supplement 3 that provides certain specific scenarios for Nuclear Power Plants where shelter in place for close in populations, followed by evacuation once other populations are evacuated, affords a dose reduction. This is referred to as staged evacuation. It might be worth at least acknowledging this within this document for consistency.

3. Page 17, 6th Bullet

- If a major release of radioiodine or particulate materials occurs, inhalation dose may be a controlling criterion for protective actions

The EPA has made the decision to remove the Thyroid dose from consideration for evacuation with a reasonable explanation. However, if the EPA believes that thyroid dose from inhalation can still be a controlling factor for Protective Actions then it should remain. We recognize that the committed dose to the thyroid (organ) and the inhalation dose to the lung from inhalation are separate calculations. However, unless there is an explanation of how it can be controlling for one (lung) and not for another (organ) will be difficult to justify the elimination of the PAG for the thyroid.

4. Table 2-6, Page 31

Are the levels indicated in this table consistent with FEMA guidance for NPPs? Double check.

Chapter 3

1. Page 35, 2nd Paragraph

The concept of "Avoided Dose" is introduced here in the document. The concept of avoided dose is not well understood nor clearly discussed in any other federal guidance document. It would be beneficial to users of this manual to promote consistency in its application if there were a section within the document that discussed "avoided dose" and how that applies to decision making about PAGs. Terry Kraus (DOE) provided a good overview of the subject at the 2013 Annual Meeting of the Advisory Team. He can provide a good discussion of the topic if EPA believes that the discussion is appropriate for this document. We believe that it would be useful.

2. Page 38, 3rd Bullet, Section 3.3.2

People who were previously evacuated, but reside outside the relocation area and may now return home. A gradual return is recommended.

Since the discussion of this Chapter is for the Intermediate Phase and is limited in scope to the assessment and actions for relocation and dose reduction, the bullet that discusses return or "reoccupancy" is probably inappropriate for this section. While there is agreement that the Intermediate and Late Phases will overlap, in certain circumstances quite considerably, return discussions should be limited to Late Phase actions. It is appropriate for decision makers during this phase to concentrate on protective actions that will further reduce public exposure from residual contamination, from ingestion of contaminated food, water and milk and dose reduction from mitigation strategies. Including return considerations in this section may refocus efforts away from assessment of public health impacts.

3. See Attachment 1 for discussion and comments on the development of Water PAGs

Chapter 4

1. See Attachment 1 for a more detailed discussion of Late Phase Actions and Clean-up standards.

2. The document fails to discuss the turnover process from DOE to EPA for environmental monitoring and assessment. For the late phase discussion in Chapter 4, it is unlikely that the ICS/NIMS structure will remain in place for extended periods of time as assets are no longer required and appropriate controls are in place. We believe that more consideration be given to what the structure for command, control and decision making will look like over time. While there may still be elements in place, there will likely be significant changes over time.

3. While there is a great deal of discussion regarding waste, this document needs to recognize that the responsibility for waste does not fall to state and local government agencies. This is an impossible task for the federal government to tackle for the long term storage of waste let alone the substantial quantities that will be generated following a large scale radiological incident. More consideration needs to be given to this section. At the very least it should clearly state that responsibility for radioactive waste following an incident will be shared among state and federal agencies.

Sara DeCair
Radiation Protection Division
Center for Radiological Emergency Management, Mail Code 6608J
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW.,
Washington, DC 20460

RE: Comments on DRAFT Protective Action Guidelines; Docket ID No. EPA-HQ-OAR-2007-0268

Dear Sara,

Attached please find my comments on the revised 2013 PAG Manual—Protective Action Guides and Planning Guidance for Radiological Incidents.

This is an impressive document that sets the foundation of our nation's radiological emergency response technical structure and the Environmental Protection Agency's continued stewardship of this doctrine is greatly appreciated.

My comments are confined to the following sections:

2.7. CONTAMINATION LIMITS AND MONITORING OF THE ENVIRONMENT AND POPULATIONS

2.8. SURFACE CONTAMINATION CONTROL

I am a Certified Health Physicist with over 20 years of experience in radiological emergency response. My comments are my own and do not represent the opinions of my employer, Lawrence Livermore National Laboratory, nor any of the organizations that I support.

Please do not hesitate to contact me if you have any questions,

Brooke Buddemeier

Brooke Robert Buddemeier
Certified Health Physicist
Brooke2@bigfoot.com

Comments on 2.7. CONTAMINATION LIMITS AND MONITORING OF THE ENVIRONMENT AND POPULATIONS

Although this section is only 4 paragraphs, it has several key statements that define terms that are not consistent with the rest of the document. The second paragraph reads:

> ***"People working in the parts of the restricted areas in which their dose from the residual radioactivity would exceed 2 mrem (20 µSv) in any hour or 100 mrem (1 mSv) in a year should operate under the controlled conditions established for occupational exposure."***

With this sentence, the PAG seems to have defined a "restricted area" as being above 2 mrem/hr or 100mrem/yr without a definition of the actions that must occur within this area to protect the public or responders. Restricted to whom? For what reason?

Given that the lowest actionable level defined in the early phase is the area where an exposure could lead to **1 rem in 4 days**, this boundary would make the best actionable demarcation. Otherwise you have defined a "restricted area" that contain people who have not been provided any protective action or guidance. Presuming a steady external dose rate, 1 rem in 4 days (96 hours) would be 10.41 mrem/hr. If we round this to 10 mrem/hr, this value would be consistent with the national and internal guidance below.

This boundary is consistent with the "Hot Zone" definition of NCRP and ASTM, however I realize that different organizations define this term in different ways and a more generic "controlled" zone may be appropriate.

Controlled Area Definitions (Note: 10 mrem/h = 0.1 mSv/h = 100 µSv/h)

Agency	Zone Name	Demarcation	Numerical Value
ASTM E2601-08	Hot Zone	Hot Line	Hot line: not to exceed 10 mR/h (0.1 mSv/h) when reasonably achievable.
IAEA Manual for First Responders to a Radiological Emergency	Inner cordoned area (Hot Zone)	Safety Perimeter	Ambient dose rate of 100 µSv/h measured at 1 m above ground level or from an object; boundary of inner cordoned area.
IAEA (2003) *Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency*	Inner Cordoned Area Radius (Safe Distances)	N/A	- Ambient dose readings of 100 µSv/h - 1000 Bq/cm2 gamma/beta deposition - 100 Bq/cm2 alpha deposition
CRCPD RDD Handbook (2006)	Low Radiation Zone	N/A	< 10 – 100 mR/hr within a reasonable distance of the epicenter of the blast. If there is a *large* population to be evacuated in the *low* radiation zone (< 10 - 100 mR/hr), self-decontamination at home to the extent possible may be advised.
NCRP 138	The initial alarm level is significantly higher than natural background so that		The NCRP recommends that an ambient dose rate of approximately 0.1 mSv h^{-1} is a suitable initial alarm level.

	false positive indications are avoided.		(page 98)
NCRP Commentary #19	N/A	Outer Perimeter	• 10 mR/h exposure rate (~0.1 mGy/h air-kerma rate); • 60,000 dpm/cm^2 (1,000 Bq/cm^2) for beta/gamma surface contamination; and • 6,000 dpm/cm^2 (100 Bq/cm^2) for alpha surface contamination.
NCRP 165	Hot Zone	Outer Perimeter (As defined in NCRP Commentary No. 19)	Establish the hot zone boundary if any of the following are exceeded: • 10 mR/h exposure rate (~0.1 mGy/h air-kerma rate); • 60,000 dpm/cm^2 (1,000 Bq/cm^2) for beta/gamma surface contamination; and • 6,000 dpm/cm^2 (100 Bq/cm^2) for alpha surface contamination.
The Federal Planning Guidance for Response to a Nuclear Detonation	N/A	The 0.01 R/h boundary	The area at which radiation controls should be initiated by responders.

The section's last paragraph (below) is inaccurate for reasons I detail in the next section. Specifically, ***two times (2x) the existing background*** levels is not a valid measurement for release of an object.

> ***"A contaminated item should not be released to an unrestricted area. Based on incident and locality specific considerations, it may be acceptable to release contaminated materials if the level of surface contamination is less than two times (2x) the existing background levels. As an alternative to decontamination, contaminated items (i.e., not people or animals) may be retained in the restricted area while the radiological contamination decays."***

Recommended Resolution for Section 2.7 (changes underlined)

"People working in the parts of the <u>hot zone [or controlled areas]</u> in which their dose from the residual radioactivity would exceed <u>10 mrem (100 µSv)</u> in any hour should operate under the controlled conditions established for occupational exposure."

"A contaminated item should not be released to an <u>uncontrolled</u> area. Based on incident and locality specific considerations, it may be acceptable to release contaminated materials if the level of surface contamination <u>is below acceptable release criteria</u>. As an alternative to decontamination, contaminated items (i.e., not people or animals) may be retained in the restricted area while the radiological contamination decays."

Comments on 2.8. SURFACE CONTAMINATION CONTROL

The contamination screening levels provided on pages 30-32 should be reconsidered for several reasons:

1) They are not protective of people and the environment. As written, this guidance could result in deterministic effects (e.g., acute exudative radiodermatitis) and unnecessary increased stochastic risk (e.g., skin cancer). Therefor this recommendation conflicts with the technical basis of the PAG manual.
2) The decontamination recommendations may cause more harm than benefit as the guideline to continue to attempt decontamination until below "2X Background" may result in physical harm and elevated internal uptake.
3) They are inconsistent with national and international guidelines
4) They are not scientifically derived since the concept of "2X Background" is a rule of thumb and not a measurement or traceable reference tied to a specific risk or health effect.

Although I applaud the authors for trying to find a simple solution applicable in the field, it is the purpose of this document to set technical, justified guidelines that balance the benefit of any action to the potential harm that it may cause. In this regard, the PAG should provide contamination monitoring recommendations based on the risk that contamination poses to the population, not "*derived primarily on the basis of easily measurable radiation levels using portable instruments*."

The PAG's contamination monitoring guideline should be a defendable, discrete, measureable value expressed in terms of surface contamination (e.g. Bq/m^2) or spot contamination (Bq) that can be later converted to operational procedures that are specific to the instruments and the technique used by the responders. Examples of "operationalizing" technical guidance can be found in Appendix B, "How to Perform a Radiation Survey for Contamination: Instructions for Workers," of NCRP Report No. 166 and "Handbook for Responding to a Radiological Dispersal Device. First Responders Guide—The First 12 Hours (CRCPD, 2006)"

For population monitoring, the PAG referenced CDC's 2007 (Predecisional draft) document "Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners," but failed to heed the recommendation of that document

> "The initial screening criteria must focus on preventing acute health effects and must take into account the magnitude of the incident and availability of resources. The specific operational criteria provided to first responders must match the types of instruments they will be using."

Appendix C of CDC Population Monitoring guide identifies the various national and international recommendations at the time of its writing. I have summarized these recommendations below and added more recent guidance documents.

Note that the term "Screening" (as opposed to formal monitoring) is not well defined. Especially by the 2013 EPA PAG Manual which used the screening term for a variety of activities in this section.

- Defining "early screening" as when "The stations should be set up to provide simple (rapid) decontamination if needed and to evaluate whether affected people should undergo more extensive decontamination or other special care" in areas up to 5mR/hr.
- Table 2-5 defines "Emergency Screening" as twice background in areas up to 1 mR/hr.
- Table 2-6 defines "Screening Levels for People and Objects" as twice background in areas up to 0.1 mR/h

Since "2X background" is essentially based on the radiation / contamination levels at the location that measurements are being made, this resulted in 3 different "screening" levels and descriptions.

Many national guidance documents list two different monitoring levels or techniques:

- A rapid assessment level, often termed **screening**, where action is warranted to prevent adverse effects and the quickly separate people that need more immediate decontamination. Screening is often performed before decontamination and is meant for high throughput of personnel.
- A more deliberate **monitoring** level, often for post decontamination or when the number of victims is small. This monitoring is performed to look for lower levels of contamination, often taking much longer to perform.

For the purpose of this commentary, I have used the definitions above to define the categories below.

Why the guidance is not protective:

Without specifying an instrument efficiency and survey technique (i.e., how close and how slow) a "measurement" of "twice background" could easily miss significant contamination levels on people and objects. This is true even on the measurements made in the low background areas.

The activity of "frisking" for contamination inherently involves getting close to the surface you are checking (often within a few inches) and moving slowly over the entire surface area (2 inches per second is often used as a rule of thumb, however this could result in a 20+ minute survey for an adult using a side or end window probe). Since this is not specified, users are not likely to perform an optimal frisk.

Even when performed optimally, a moving probe cannot detect contamination (spot or widespread) at the same efficiency as a stationary measurement. This is especially true in an elevated background. The FEMA study sited below found that even some Pancake GM instruments could not find 1.0 µCi spot contamination (which is enough to cause acute effects) when operating in a 0.1 mR/hr background.

The ability of a person to find contamination is not only based on the detector's efficiency, but also its response time and the ability of the operator to determine the change in reading. Since an instrument type is not specified, an ion chamber (commonly used in response) could be selected which would make detection of harmful levels of difficult due to lack of audio feedback and slow response time.

Without providing amplifying information on the type of instruments to be used and the method of survey, the current screening levels used in the 2013 PAG Manual may not be able to detect contamination levels on people that could result in acute effects and increased risk of cancer, even when measurements are made in low background areas.

Why the guidance may cause more harm than benefit

In addition to potentially missing significant levels of contamination (using the wrong instrument, technique, or operating in a high background area), the "2X Background" can also result in being too sensitive when applied to a sensitive instrument held stationary over a particular spot.

This is likely to happen when contamination is discovered on a person. According to Table 2-6 of the 2013 PAG Manual, a person with detectable contamination would be sent through simple decontamination (flushing with water and wiping) and then monitored again.

Given that the location of the contamination on the body is known, the responder is likely to make a stationary, close measurement of the area with a sensitive pancake meter. Even a small amount of remaining contamination would likely resulting in another positive "2X background" reading. The person is then put through a full decontamination (washing or gentle scrubbing with soap) and monitored again.

Again, the responder is likely to make a stationary, close measurement of the area with a sensitive pancake meter, resulting in another positive "2X background" reading. These stationary, close readings can find very low levels of (< 100 dpm/cm^2) contamination that are essentially harmless to the person, but the guidance is to "***Continue to decontaminate.***"

This can result in harm as even "gentle scrubbing" if repeated several times will result in reducing the skin as a barrier, allowing the radioactive material to enter the body.

Low levels of detectable contamination are not a health risk (either acute or stochastic) and should not be managed as a medical issue requiring "special evaluation." This will deplete and distract important decontamination capabilities and medical resources from victims who have actual health risks.

Instead of "2X background," it is far better to identify a specific level of contamination that, based on calculated risk, action is warranted to avoid the exposure. An example of this calculation can be found in the FEMA document (Background information of FEMA-REP-22) which uses dose conversion factors of EPA 520/1-89-016 *Evaluation of Skin and Ingestion Exposure Pathways* to convert skin contamination to skin dose at a skin depth of 7 mg/ cm^2 to derive the threshold Minimum Detectable Level of activity on a 0.2 cm^2 spot to **avoid** acute exudative radiodermatitis. Similar calculations were done to calculate protection from skin cancer.

For both spot and widespread skin contamination, protective threshold surface contamination values were calculated for both fixed (presumed prolonged exposure) and loose (easily decontaminated, therefore shorter exposure) contamination. See the top line of table below for more information.

Examples of national and international guidance for contamination

Source	Screening Level	Monitoring or Post Decon Level	Notes
Contamination Monitoring Guidance for Portable Instruments Used for Radiological Emergency Response to Nuclear Power Plant Accidents, Federal Emergency Management Agency, FEMA-REP-22, October 2002	Acute: Spot contamination of 1.0 µCi (37 kBq) Stochastic: 0.04 µCi/cm2, (1.5 kBq/cm^2 or 90,000 dpm/cm^2) Operationally, this resulted in: 10 mR/h (CDV-718 GM); 10,000 cpm (CDV-700 Pancake); or 100,000 CPM (modern GM Pancake)	Acute: Spot contamination of 0.1 µCi (3.7 kBq) Stochastic: 0.004 µCi/cm2 (0.15 kBq/cm^2 or 9,000 dpm/cm^2) Operationally, this resulted in: 1 mR/h (CDV-718 GM) or 1,000 cpm (CDV-700 Pancake); or 10,000 CPM (modern GM Pancake)	It was presumed that the ***screening level*** referred to the limit on "loose contamination" which is presumed to stay on the person 36 hours. The (lower) ***monitoring level*** was for the limit on fixed contamination and presumed to stay on the person 2 weeks. Note: both acute (spot) and stochastic (uniform distribution) activity levels result in similar detectability for each column, noted as the operational measurements for two different types of instruments.
Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism, National Council on Radiation Protection and Measurements (NCRP) Commentary No. 19, December 2005	Spot contamination on the skin exceeding 1 µCi (37 kBq) have priority for decontamination.	Decontamination procedures should "strive to reduce" surface contamination to below the following limits: • *0.1* µCi *(3.7 kBq) on any one spot.* • *10,000 dpm/cm^2 (167 Bq/cm2) surface body contamination*	Note that NCRP contamination guides are numerically similar or equal to FEMA's limits, however they are stated in different ways: The ***screening level*** is defined as the level when a person becomes a priority for decontamination (i.e., action is **warranted**). The (lower) ***monitoring level*** is defined as the level that "decontamination procedures should strive to achieve"
Handbook for Responding to a RDD. First Responder's Guide— the First 12 Hours, Conference of Radiation Control Program Directors, Inc.(CRCPD), 2006	*In case of a large incident or if adequate resources are not available: GM Pancake Probe: 10,000 cpm (0.05 mR/h using a gamma detector)*	*GM Pancake Probe: With contamination levels up to 1,000 cpm, people can be instructed to go home and shower*	The CRCPD manual takes the opposite approach of defining a level below which people can *be instructed to go home and shower,* instead of defining a level above which some action should be taken.

ED_001057_00026684

Manual for First Responders to a Radiological Emergency, International Atomic Energy Agency (IAEA), October 2006	0.1 mrem/h (1 µSv/h) measured at 10 cm (4 inches) from the body *>600,000 dpm/cm2 (10,000 Bq/cm2) beta/gamma contamination.* *> 60,000 dpm/cm2 (1,000 Bq/cm2) for alpha contamination.*		*"These criteria indicate the level of skin contamination which could represent a hazard from direct irradiation of the skin, from intake by inadvertent ingestion, or that could indicate that the person has already inhaled or ingested significant amounts of radioactive material."* *"The criteria were established at levels which are below those at which contaminated people would experience deterministic health effects warranting medical treatment or follow-up. The criteria were established at levels which are below those at which contaminated people would experience deterministic health effects warranting medical treatment or follow-up."*
NCRP Report No. 165: Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers (2010)	>0.1 mR h_{-1} exposure rate (~1 µGy h_{-1} air-kerma rate) at 10 cm, >600,000 dpm cm^2 (10,000 Bq cm^2) beta and gamma surface contamination, or >60,000 dpm cm^2 (1,000 Bq cm^2) for alpha surface contamination		Essentially the same screening levels as IAEA (2006): *"Decontamination (skin and clothing) should always be performed [at the Screening levels]."* *"Target levels for adequate decontamination should be in the local and regional emergency plans, but may be modified at the time of the response. These levels may be different than "any detectable level of contamination" and depending on the number of people to be monitored may make surveys with this level of detail impractical (CRCPD, 2006; NCRP, 2005)."*
NCRP Report No. 166: Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (2010)		1,000 cpm using a *GM Pancake probe. This document estimated this contamination to be* ~670 dpm/cm^2*(see below)*	Although the 1,000 cpm value was listed as "screening," the text indicated it was a non-urgent value in alignment with the monitoring definition above: "*Persons with more than this level of contamination on their skin should be decontaminated when it is possible and appropriate to do so, and persons with less than this level of contamination may be sent home."*

ED_001057_00026684

Not Scientifically Derived:

The stated technical basis is that the "screening levels are examples derived primarily on the basis of easily measurable radiation levels using portable instruments," which is not a risk derived basis. The 2013 PAG Manual should set objective guidelines based on risk, not "whatever can measured." It should be up to the implementing organizations to then determine how to use their instruments to meet the requirement, or obtain instruments that can meet the need.

An example of a more rigorous risk and dose based derivation can be found in "Contamination Monitoring Guidance for Portable Instruments Used for Radiological Emergency Response to Nuclear Power Plant Accidents, Federal Emergency Management Agency, FEMA-REP-22," October 2002 shown in the table above. The following is quoted from the document.

> **Acute Exudative Radiodermatitis threshold dose was calculated** "based on dose conversion factors in Appendix B of EPA 520/1-89-016 *Evaluation of Skin and Ingestion Exposure Pathways* (Reference 4) for the mix of radionuclides assumed to be associated with a major reactor accident, the factor to convert skin contamination to skin dose at a skin depth of 7 mg/cm^2, is about 7 rem/h per µCi/cm^2. Therefore, if the activity is concentrated in a 0.2 cm^2 area, then the threshold MDL of activity on the spot to **avoid** acute exudative radiodermatitis is **34 µCi h** (i.e., 1,200 rem on a spot / 7 rem per µCi h/cm^2 x 0.2cm^2). Dividing 34 µCi h by 36 h and 336 h of exposure yields **0.95 µCi** and **0.10 µCi** for loose and fixed contamination respectively."
>
> **Skin Cancer Risk was calculated** based on a "time-integrated concentration on the skin that would produce a dose of 10 rem. The factor to convert from time-integrated skin contamination to a dose of 10 rem is **1.4 µCi h/cm^2** (i.e., 10 rem /7 rem per µCi h/cm^2). To determine the time-integrated activity necessary to yield a dose of 10 rem to the skin of the whole body, it is necessary to multiply the time-integrated concentration per square centimeter that will yield a dose of 10 rem times the area of the skin on the whole body (about 18,000 cm^2 for an adult)… [T]he threshold level corresponding to adequate protection of the public from skin cancer under emergency conditions is a time-integrated activity of **25,200 µCi h** (i.e., 1.4 µCi h/ cm^2 x 18,000 cm^2). This is independent of the distribution of the contamination on the skin. Dividing 25,200 µCi h by 36 h and 336 h of exposure yields rounded values of **700 µCi** and **75 µCi** for loose and fixed contamination respectively. Since a portable instrument would view only a small area of skin, the threshold level in activity per unit area (µCi/ cm^2) is of interest. This is calculated by dividing the activity on the total body by the area of the skin of the total body (18000 cm^2). This yields **0.039 µCi/cm^2** and **0.0042 µCi/ cm^2** as the concentrations of concern regarding risk of cancer from loose and fixed widespread contamination respectively."

Another example of a rigorous derivation can be found in NCRP Report No. 166: Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (2010):

"The area of a typical pancake-type detector is 15 cm^2. If the counting efficiency of the detector is 10%, then 1,000 cpm in the area beneath the detector corresponds with a total of 10,000 dpm over 15 cm^2 (~670 dpm/cm^2). Calculations performed using VARSKIN 3 (Durham, 2006) indicate that skin dose from ^{90}Sr (a high-energy beta emitter) contamination is 2.5×10^{-2} µSv/h (2.5×10^{-3} mrem/h) for 1 dpm-cm, so 670 dpm/cm^2 result in a skin dose of ~16.5 µSv h_{-1} (1.65 mrem/h). This level of exposure will produce a radiation dose of <0.5 mSv (50 mrem) to the skin even if left unwashed for 24 h and poses no physical risk to the contaminated person. Assuming more realistic counting efficiencies for high-energy beta emitters (many pancake-type GM probes are 30 to 40 % efficient for this energy of beta radiation) reduces the dose further. An action level of 1,000 cpm should remain protective of health from uptake through broken skin (*e.g.*, wounds) or through the mouth or nose. The amount of radioactivity contained in 670 dpm is ~112 Bq (~4 nCi). This level of uptake is much lower than the most limiting CDG listed in Table 3.14 of NCRP Report No. 161 [5,200 Bq (0.14 µCi) for ^{227}Ac] (NCRP, 2008a)."

Note that NCRP 166 derived surface contamination of ~670 dpm/cm^2 was to avoid a dose of 0.05 rem if the material stayed on the skin for 24 hours. Using this methodology on the 2013 PAG Manual's organ specific dose guidance of 5 rem (inferred by Table 1-1), then the skin contamination guideline would be closer to 67,000 dpm/cm^2

As a comparison, if we convert the FEMA guidance of 90,000 dpm/cm^2 (based on 10 rem skin dose over to 36 hours) to the equivalent 5 rem skin dose in 24 hours, we would get a remarkably similar 67,500 dpm/cm^2. This demonstrates consistent results despite the different calculation methods.

Emergency deposition and unconditional release of contaminated vehicles and equipment:
During the emergency phase, the IAEA emergency response guidance provided guidance for potentially contaminated equipment and vehicles may be useful, I have converted to traditional units:

Equipment or vehicle contamination criteria

For use by first responder monitor:
Ambient dose rate at 10 cm:
> 0.1 mR/h (1 µSv/h) and < 1 mR/h (10 µSv/h): use of equipment or vehicle for response activities only
> 1mR/h (10 µSv/h) and < 10 mR/h (100 µSv/h): allow use of equipment or vehicle for critical response activities only
> 10mR/h (100 µSv/h): isolate equipment or vehicle and use only with radiological assessor approval

Discussion
These criteria can only be used to assess contamination from gamma emitters and can not be used to adequately assess beta and alpha contamination which could represent a hazard from intake by inadvertent ingestion or skin dose from contamination. Therefore the response personnel using equipment that may be contaminated should always take actions to reduce intake from inadvertent ingestions (e.g. wash hands and face) and skin dose from contamination (e.g. wear gloves).

The criteria were set up on the levels to ensure that responders are protected and that critical equipment will remain available:

> 0.1 mR/h (1 µSv/h) and < 1 mR/h (10 µSv/h):
At this level there is no hazard of severe deterministic health effects from external exposure. This level was established to be consistent, assuming a 10% transfer rate, with that at which public and responders would be advised to be decontaminated in accordance with Instruction 5.
> 1mR/h (10 µSv/h) and < 10 mR/h (100 µSv/h):
Allow use of critical items. This level may be the lowest ambient dose rate that can be effectively measured near the boundary of the inner cordoned area. For gamma emitters the dose resulting from the use of items contaminated at this level will be well below that resulting in severe deterministic health effects.
> 10mR/h (100 µSv/h):
Isolate and do not use without approval of radiological assessor. This criterion is at a level that *should be* well below that resulting in severe deterministic health effects for gamma emitters. However, it was selected to ensure that severe deterministic health effects are not possible taking into account uncertainties in measurement techniques.
Generally conservative assumptions were used to establish these criteria. It is assumed that the contaminated area is almost in contact, through clothing, with a specific area of tissue for 10 hours. Experience has shown that a much lower dose would be expected in the tissue due to movement of the source relative to the tissue over the 10 hours. It is also assumed that the ambient dose rate to the tissue itself is 1000 or more times the ambient dose rate measured at 10 cm. Assumptions used in calculation will overestimate the ambient dose rate to the tissue for most contamination scenarios (e.g. if the contamination covers an area of more than about 1 cm^2).

When not in the emergency phase, acceptable guidance can be found in standards like **ANSI/HPS N13.12-1999: Surface and Volume Radioactivity Standards for Clearance. Table 1 of that standard is provided for reference.**

Table 1 Screening levels for clearance

Radionuclide Groups[a]	Screening Levels (S.I. Units)[b]	Surface Screening (Conventional Units)[b]	Volume Screening (Conventional Units)[b]
	(Bq/cm^2 or Bq/g)[c]	(dpm/100 cm^2)	(pCi/g)
Group 1 Radium, Thorium, and Transuranics: ^{210}Po, ^{210}Pb, ^{226}Ra, ^{228}Ra, ^{228}Th, ^{230}Th, ^{232}Th, ^{237}Np, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{244}Cm, and associated decay chains[d], and others[a]	0.1	600	3
Group 2 Uranium and Selected High Dose Beta-Gamma Emitters: ^{22}Na, ^{54}Mn, ^{58}Co, ^{60}Co, ^{65}Zn, ^{90}Sr, ^{94}Nb, ^{106}Ru, ^{110m}Ag, ^{124}Sb, ^{134}Cs, ^{137}Cs, ^{152}Eu, ^{154}Eu, ^{192}Ir, ^{234}U, ^{235}U, ^{238}U, Natural Uranium[e], and others[a]	1	6,000	30
Group 3 General Beta-Gamma Emitters: ^{24}Na, ^{36}Cl, ^{59}Fe, ^{109}Cd, ^{131}I, ^{129}I, ^{144}Ce, ^{198}Au, ^{241}Pu, and others[a]	10	60,000	300
Group 4[f] Other Beta-Gamma Emitters: ^{3}H, ^{14}C, ^{32}P, ^{35}S, ^{45}Ca, ^{51}Cr, ^{55}Fe, ^{63}Ni, ^{89}Sr, ^{99}Tc, ^{111}In, ^{125}I, ^{147}Pm, and others[a]	100	600,000	3,000

(a) To determine the specific group for radionuclides not shown, a comparison of the effective dose factors, by exposure pathway, listed in Table A.1 of NCRP Report No. 123I (NCRP 1996) for the radionuclides in question and the radionuclides in the general groups above shall be performed and a determination of the proper group made, based on similarity of the factors.
(b) Rounded to one significant figure.
(c) The screening levels shown are used for either surface activity concentration (in units of Bq/cm^2), or volume activity concentration (in units of Bq/g). These groupings were determined based on similarity of the scenario modeling results, as described in Annex B.
(d) For decay chains, the screening levels represent the total activity (i.e., the activity of the parent plus the activity of all progeny) present.
(e) Where the Natural Uranium activity equals 48.9% from ^{238}U, plus 48.9% from ^{234}U, plus 2.25% from ^{235}U.
(f) Radionuclides were assigned to groups that were protective of 10 µSv/y (1.0 mrem/y) and were limited to 4 groups for ease of application, as discussed in Annex B.

Recommended Resolution for Section 2.8

For the reasons discussed above the "2X background" as a PAG reference value is inappropriate for a final evaluation of a person's risk, though it can be used in high background areas as an indicator of "something significant." However it should not be used as unconditional release criteria as measurements made in high background areas can hide significant contamination.

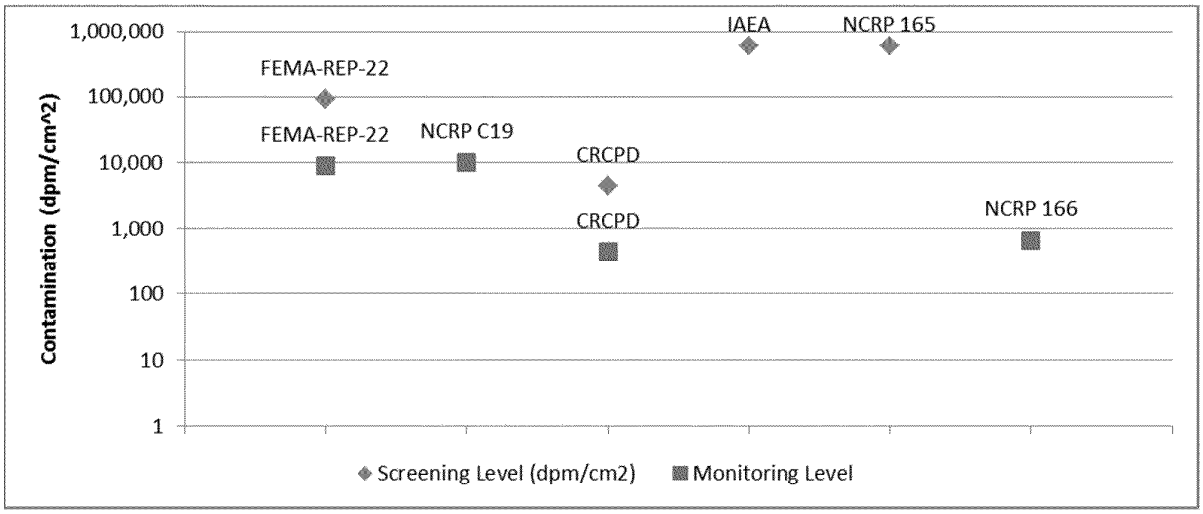
Suggested revision of paragraph #4:

***When early screening is needed after a major incident*— After plume passage, it may be necessary to establish emergency contamination monitoring stations in areas not qualifying as low background areas. Gamma exposure rates in such areas should be less than 10 millirem (100 µSv) per hour. These monitoring stations should be used only during the early phase after major atmospheric releases to monitor people emerging from possible contamination areas. The stations should be set up to provide simple (rapid) decontamination if needed and to evaluate whether affected people should undergo more extensive decontamination or other special care. Table 2-5 provides guidance on surface contamination levels for use if such centers are needed.**

Table 2-5. Recommended Surface Contamination Screening Levels for Emergency Screening of People and Objects at Screening Station in High Background Radiation Areas (0.1 mR/h to 10 mR/h Gamma Exposure Rate)

Ambient dose rate at 10 cm from surface	**Recommended Action**
<2x existing background	Forward to low background area for further screening
>2x existing background, or > 0.1 mR/h (1 µSv/h) and < 1 mR/h (10 µSv/h)	Use of equipment or vehicle for response activities only*
> 1mR/h (10 µSv/h) and < 10 mR/h (100 µSv/h)	Allow use of equipment or vehicle for critical response activities*
> 10mR/h (100 µSv/h)	Isolate equipment or vehicle and use only with RadCon approval*
>2x existing background on person	Decontamination if available then forward to low background monitoring area for further assessment.
Screening stations in such high exposure rate areas are for use only during the early phase of an incident. Screening is performed rapidly (< 5 minutes) on each person or object, often checking only likely contamination areas on the object or person.	

As noted above, there is not an accepted standard for appropriate monitoring levels. As can be seen by the chart below national and international recommendations vary by orders of magnitude. However the concept and technical bases for these standards lay the groundwork for an appropriate 2013 PAG Manual reference level.



Using the calculation method provided in FEMA-REP-22 and NCRP 166, a new table 2-6 can be constructed based on dose and risk values that align with the technical basis of the 2013 PAG Manual. To do this, the 2013 PAG Manual authors need to define:

1) What is the skin dose (organ dose) where actions are suggested or warranted?
2) What is the presumed length of exposure, particularly the presumed time before initial decontamination?

Example Revised Table Text

If, for example, the actionable skin dose is 10 rem and the assumed time to decon (without assistance) is 36 hours then the monitoring objective can be based on FEMA-REP-22 (which is guidance that is already in practice for nuclear power response).

Table 2-6. Recommended Surface Monitoring Levels for People[a] and Objects at Monitoring Stations in Low Background Radiation Areas (<0.1 mR/h Gamma Exposure Rate)

Measurement Criteria	Recommended Action
Equipment: dose rate at 10 cm from surface of > 0.1 mR/h (1 μSv/h) and < 1 mR/h (10 μSv/h)	Use of equipment or vehicle for response activities only*
Equipment: dose rate at 10 cm from surface of > 1mR/h (10 μSv/h) and < 10 mR/h (100 μSv/h)	Allow use of equipment or vehicle for critical response activities*
Equipment: dose rate at 10 cm from surface of > 10mR/h (100 μSv/h)	Isolate equipment or vehicle and use only with RadCon approval*
Equipment and Vehicles < 0.1 mR/h (1 μSv/h) at 10 cm from the surface.	Use appropriate release criteria (like ANSI N13.12) to determine if suitable for unconditional release.
If personnel contamination > 90,000 dpm/cm^2, spot contamination > 2.2x10^6 dpm (1 uCi), or radiation reading >0.1 mR/h (1 μSv/h) at 20cm	Priority for decontamination, change clothing, gently wash exposure skin and hair. Resurvey after decontamination.
If personnel contamination > 9,000 dpm/cm^2, or spot contamination > 2.2x10^5 dpm (0.1 uCi).	Simple decontamination: flushing with water and wiping is an example of a simple decontamination effort. If resurvey still above measurement criteria then change clothing, gently wash exposure skin and hair. If unable to get below 10,000 dpm/cm^2 then send for special evaluation.

*Decontamination can be attempted (resurvey afterward) or equipment may be stored or disposed of as appropriate.

[a]People reporting to monitoring stations in low background radiation areas have been previously instructed to change and bag clothes, wash other exposed surfaces such as cars and their contents and then report to these centers for monitoring.

Monitoring is a more thorough assessment than screening, often using sensitive Pancake GM detector within a few inches of the surface. Specific instructions for monitoring can be found in CDC's *Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners*

The highlighted text can be scaled if you use a different organ dose objective or assumed time that loose contamination is on the body.

Although contamination levels such as 9,000 dpm/cm2 or spot contamination levels of 2.2x105 dpm may appear large, they are actually quite difficult to detect while frisking (scanning the surface of an object or person). Specific minimum detection levels for various instruments for a variety of frisking speeds can be found in the Background document for FEMA-REP-22 or calculated using "Rad Pro Calculator" found on http://www.radprocalculator.com/

Note: a more restrictive release criteria will result in longer survey times:

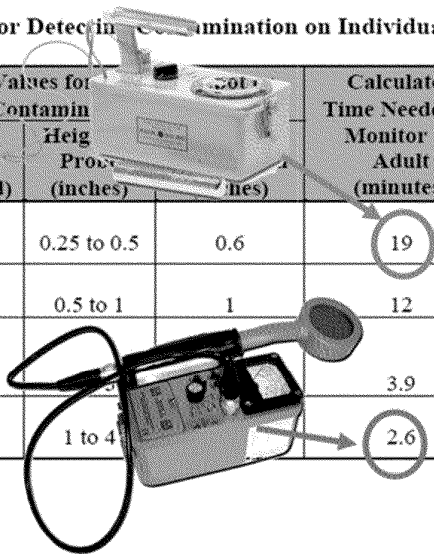
For example , in order to find 9,000 dpm/cm^2, it would take nearly 20 minutes using a common CDV-700 hotdog GM. Even with a modern Pancake GM instrument it will take 3-4 minutes per person.

Public Decon: Federal Requirements and Recommendations

FEMA REP-22 MEASUREMENT CRITERIA FOR INDIVIDUALS

Recommended Parameter Values For Detecting Contamination on Individuals[a]

Instrument/ Detector Combination	Parameter Values for Widespread Contamination: Probe Speed (inches/second)	Height Probe (inches)	[illegible] (inches)	Calculated Time Needed to Monitor an Adult (minutes)
CD V-700 with side window detector[b]	4	0.25 to 0.5	0.6	19
CD V-718 with end window detector	3	0.5 to 1	1	12
All tested instruments with pancake detectors, except the Victoreen 190	6	[illegible]	[illegible]	3.9
Victoreen 190 with pancake detector[b]	6	1 to 4	[illegible]	2.6



If there are a large number of people to be monitored, this can result in a significant delay in discovery.

Conference of Radiation Control Program Directors, Inc.

Office of Executive Director ❖ 1030 Burlington Lane, Suite 4B ❖ Frankfort, KY 40601
Phone: 502/227-4543 ❖ Fax: 502/227-7862 ❖ Web Site: www.crcpd.org

Board of Directors

Chairperson
Joseph G. Klinger
joe.klinger@illinois.gov
Illinois

Chairperson-Elect
Michael Snee
Ohio

Past Chairperson
Earl W. Fordham, CHP
Washington

Treasurer
Jared Thompson
Arkansas

Members-at-Large
David J. Allard, CHP
Pennsylvania

Lisa Bruedigan
Texas

Patrick Mulligan
New Jersey

Office of Executive Director

Kentucky

Executive Director
Ruth E. McBurney, CHP
rmcburney@crcpd.org

September 16, 2013

Air and Radiation Docket and Information Center
Environmental Protection Agency
Mail Code 6102 T
1200 Pennsylvania Ave NW.
Washington DC, 20460

Attn: Docket ID No EPA-HQ-OAR2007-0268

The Conference of Radiation Control Program Directors, Inc. (CRCPD) is a professional organization dedicated to radiation protection. The mission of CRCPD is to promote consistency in addressing and resolving radiation protection issues, to encourage high standards of quality in radiation protection programs, and to provide leadership in radiation safety and education. CRCPD's primary goal is to make sure radiation exposure to individuals is kept to the lowest practical level, while not restricting its beneficial uses. CRCPD's membership includes the directors and members of State radiation control programs across the nation as well as other individuals interested in radiation protection issues. Many of our member States have nuclear power plants within their jurisdictions, and many of them also have actual long-term contaminated site clean-up experience.

CRCPD believes the efforts of the EPA to revise the current PAG Manual are a positive step. To the extent possible, we have attempted to provide comments on the specific issues that were requested in Section E of the Federal Register Notice. Those comments as well as other detailed comments are attached. However, we have some generic comments that apply to the entire document that we feel should be addressed before this new manual is considered final.

The title of the PAG Manual is "Protective Action Guides and Planning Guidance for Radiological Incidents." The first three chapters are clearly focused on the basis for the PAGS, the numerical values for comparing projected dose, and the actions that should occur when EPA PAGs are exceeded. The fourth chapter focuses more on planning guidance and does not include specific PAG values for long term return and recovery decision making. Therefore, we feel that the title of the fourth chapter should be changed to "Planning Considerations for the Late Phase" instead of "Guidance for the Late Phase."

The CRCPD feels that referencing the 1992 version of the PAG manual is detrimental to the purpose of the new manual and could lead to confusion. When the new version of the manual becomes final, it should completely replace the old version. CRCPD feels that the sections of the old PAG manual that are still applicable should be contained in the new PAG manual. In addition we feel some of the references contained in the new version have not been updated. An example of this is the reference to the Reactor Safety Study in section 2.4.2. This section should be updated to reference current understanding of reactor accidents as discussed in NUREG-1935, the SOARCA Report. EPA should take another look at all the references in the document to ensure they are all the most current and applicable.

On a final note the CRCPD would like to see the new EPA PAGs adopted eventually as Presidential Guidance. As this will take additional time, we also recommend the new EPA PAGs are not held up while this Presidential Guidance is sought.

Thank you for considering these comments and requests. The CRCPD stands ready to assist our Federal partners and are available to provide additional details on any of these issues should you desire. I look forward to your response.

Sincerely,

Joe Klinger, Chairperson
Conference of Radiation Control Program Directors

Attachments

Conference of Radiation Control Program Directors, Inc.
Office of Executive Director ❖ 1030 Burlington Lane, Suite 4B ❖ Frankfort, KY 40601
Phone: 502/227-4543 ❖ Fax: 502/227-7862 ❖ Web site: www.crcpd.org

ATTACHMENT 1

SPECIFIC COMMENTS SOUGHT BY EPA
Manual of Protective Action Guides

1. To implement the PAGs, the reader is referred to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) Assessment Manuals. The Assessment Manuals are updated with current International Commission on Radiological Protection (ICRP) dosimetry models (i.e., ICRP 60 series) and dose coefficients. The FRPCC also encourages the use of computational tools such as DOE's Turbo FRMAC, RESRAD RDD and NRC's RASCAL or other appropriate tools and methods to implement the PAGs. We request comment on the usefulness of this approach and seek feedback on how to facilitate implementation of these methods in emergency management plans.

CRCPD understands why EPA has chosen to recommend the use of computational tools such as Turbo FRMAC and RASCAL to calculate values to be compared to the PAGs. While we are in basic agreement with this concept, it should be made clear there may be a slight difference in results depending on which model is used.

The 1992 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400–R–92–001, May 1992) contained tables and charts that provided Dose Conversion Factors and Derived Response Levels for various radionuclides along with formulas for calculating these values. The FRMAC Assessment Manual and their Turbo FRMAC program for dose assessment do not use these terms in the same manner as the original document. The updated guidance should use consistent terminology as FRMAC or refer to their methods and tools generically as "the most current DOE/FRMAC Assessment Tools." Further, the table and charts found in the 1992 version of the PAG Manual were useful for state assessment staff as a quick reference guide. Lacking these tables and charts, it would be useful to have a single repository for all the tools available for accident assessment for various radiological accidents. Currently, Turbo FRMAC is distributed and updated through distribution of CDs to licensed organizations. RESRAD RDD is available but (from my understanding) has issues running on some IT platforms that states use.

We suggest that EPA, in conjunction with the FRPCC, consider developing web access to radiological assessment tools and reference material so that the most current versions and updated documents and guidance are accessible in a "onestop" format. It would also be extremely beneficial for the assessment tools to be web based so that distribution and updates are no longer necessary. This would allow all states to access the most current version of tools, documents and guidance that are necessary for the assessment of all types of radiological accidents, i.e. NPP, RDD, IND. It would ensure the consistent application of assessment principles and would facilitate updating methods over time as changes are made to dose calculations models (i.e. RASCAL, TurboFRMAC), dosimetry models (i.e. ICRP guidance) and other documents that would affect the calculations for radiological dose.

The Agency recognizes a short-term emergency drinking water guide may be useful for public health protection in light of the Fukushima nuclear power plant accident, which impacted some Japanese drinking water supplies. Input on the appropriateness of, and possible values for, a drinking water PAG is being sought.

ED_001057_00026684

CRCPD recommends that the final version of the PAG manual have guidance for drinking water. It is critical for situations where there are no reasonable alternative water supplies for the short term, the drinking water supply contains radioactive materials that would exceed Safe Drinking Water Standards, access to drinking water is crucial to public health, and relocation/evacuation is not feasible at that point in time. Part of this discussion should include the evaluation and consideration of the Department of Homeland Security Document, Planning Guidance for Protection and Recovery Following Radiological Dispersal Device and Improvised Nuclear Device Incidents. Interestingly, this document, issued in 2008, includes a PAG for water, Table-1, at 0.5 Rem (0.005 Sv) projected in the first year. The document states that "These values are consistent with those now used or being considered as PAGs for other types of nuclear/radiological incidents." Further, the DHS document states:

"By agreement with the Environmental Protection Agency (EPA), the Guidance being published today is final and its substance will be incorporated without change into the revision of the 1992 EPA Manual of Protective Actions Guides and Protective Actions for Nuclear Incidents (the PAG Manual). This notice of final guidance will therefore sunset upon publication of the new EPA PAG Manual (see, http://www.epa.gov/radiation/rert/pags.html). The reader will then be directed to the new EPA PAG Manual, where these provisions may be found."

It is unclear where the updated PAG guidance brings us regarding the PAG for Drinking Water. The guidance was not adopted as written (as stated in the DHS document) and the DHS guidance has sunset according to the language cited above. This leaves no recognized basis for establishing a drinking water intervention level other than those in the Safe Drinking Water Act. CRCPD does not believe that these threshold values are practical for application during significant radiological emergencies where there is widespread contamination of the drinking water supply. The 4 mRem threshold used for drinking water standards is based on multiple assumptions that include a 70-year committed dose from consumption. This is not a reasonable assumption for application during an emergency.

The EPA has provided a number of alternatives for drinking water supplies during emergency conditions that provide a means for reducing and/or avoiding dose. Recommendations should be made to consider these options and their feasibility for implementation prior to consideration of intervention levels for drinking water above the safe drinking water standards. However, if the public health risk of not having a water supply is greater than the risk of the dose received from drinking slightly contaminated water, then alternative drinking water intervention levels should be established for the short term untilan acceptable drinking water supply can be made available.

The parameters for this decision and the intervention level should be based upon the current guidance that FDA provides for food and milk combined with those established by DHS for IND/RDD events. For the Intermediate Phase, CRCPD suggests that water be included in the dose consideration for the ingestion pathway as a single value of 500mRem per year (provided that alternative water supplies are not available or feasible). That should be the upper bound of exposure from the ingestion of food, water and milk combined. Water should not be treated as a separate exposure pathway since water is a key component of diet in many ways and cannot actually be separated. During this period, the supplier shall attempt to locate and supply water that will be in compliance with the Drinking Water Standards. Water used for the production of food stuffs shall result in food levels not exceeding the FDA DILs.

It should also be noted, that any intervention level set is for interim use only, and every reasonable and feasible action should be taken to ensure that drinking water supplies for the public are brought back to an acceptable level or "normalcy" as soon as reasonably achievable.

2. The most substantive PAG change in the Early Phase is the 2001 guidance from the FDA that lowers the threshold for administration of potassium iodide (KI) to the public from 25 rem projected adult thyroid dose to 5 rem projected child thyroid dose. Chapter 2 includes a streamlined implementation scheme based on FDA's guidance. Please comment on the usefulness of this simplified guidance in the text of Chapter 2.

CRCPD has several comments about section 2.3.4.

The decision to stockpile and distribute Potassium Iodide (KI) to the general public during a nuclear emergency is a state and local government decision. There are some states that stockpile and pre-distribute, others that stockpile and distribute through Reception Centers and others that choose not to stockpile at all. The FDA provides guidance that discusses in detail the intervention thresholds and dosages for each specific age group. In this sense, the prophylactic use of KI is not a public Protective Action per se but a supplemental action that state and local decision makers use according to the plans and procedures in place.

The new EPA PAG Manual has not only referenced the 2001 FDA guidance on KI but also reproduced certain sections of the document. We understand the need to simplify the guidance for issuing KI but it is important to not leave out the dosing information for KI that was contained in the 2001 FDA guidance. It is recommended that the PAG Manual be simplified by referencing the 2001 FDA recommendations for KI and omit the proposed excerpts from the guidance. Additionally, some states do NOT recommend KI to the public. Therefore, we agree with listing KI as a supplemental protective action.

3. The skin and thyroid evacuation thresholds were removed to avoid confusion with the KI threshold. The skin and thyroid doses were 5 and 50 times higher, respectively, than the 1 to 5 rem whole-body dose guideline. Please comment specifically on the appropriateness of not retaining the skin and thyroid evacuation thresholds.

Some states wish to continue to use a Thyroid PAG as they do not currently issue KI to the public. Therefore we recommend including language in the document that states may continue to use a Thyroid PAG for evacuation or shelter if they wish to add this additional PAG to ensure the public healthand safety is protected in all possible scenarios.

4. The most substantive PAG change in the Intermediate Phase is the removal of the 5 rem over 50 years relocation PAG which was potentially being confused with long term cleanup. Please comment on the appropriateness of this change.

We feel that the removal of the long term PAG of 5 Rem is appropriate. Consideration out to 50 years should be part of the late phase/clean up criteria, not part of an intermediate phase PAG.

5. **As an extension of the PAGs, new guidance on reentry to relocation areas is provided to inform plans and procedures to protect workers and members of the public as the Intermediate Phase progresses. Please comment on the format and utility of this material.**

We feel that additional guidance on reentry is beneficial. However, the current format and content could be enhanced. The current guidance should include not only total dose that the individual should not exceed, but also provide guidelines on exposure rates, site specific conditions, and environmental conditions that should be considered before authorizing permission for reentry.

6. **Please comment on whether it would be useful to develop a new, combined Intermediate Phase PAG considering all exposure pathways to potentially simplify decision making**.

We agree with keeping the relocation PAG separate from the food PAG because the required actions to implement are so different (moving people vs. embargoing food products). However, as noted earlier, we believe that it would be beneficial to include drinking water in the estimation of ingestion pathway food and milk PAGs not to exceed a 500 mRem dose in the first year.

7. A brief planning guidance on the cleanup process is included. Please comment on the usefulness of this information, as well as how it might best be implemented in state, tribal and local plans.

This material might be better suited for an appendix. By making the guidance more of a checklist format it may also be more useful.

8. **A suggested process and organization for approaching the late phase cleanup is provided from the 2008 RDD-IND Planning Guidance. Please comment on the merging of that guidance with the 2013 PAG Manual**.

The CRCPD feels strongly that the new EPA PAG Manual needs more definitive guidance for State planners on how to implement the cleanup process. The material presented in Chapter 4 of this document and the DHS RDD-IND Planning guidance provides a "theoretical" approach to a systematic process for evaluation of long term impacts, what considerations need to be made and what stakeholders need to be involved in the process. All this information is useful for setting up the process. However, as a technical document, the EPA PAG Manual provides no guidance, references or tools to perform the technical assessment of key parameters required for decision making. That is, there is no actual guidance for the practical implementation of the process. For example, there is no method or tool identified to evaluate comparative risk for various clean-up standards. Is there a tool to assist with evaluating the risk between a 100 mRem a 50 mRem and a 25 mRem clean up standard? There is no tool or method identified in the document to assist with the evaluation of the amount of waste generated from different clean up options. Using the above example, it is imperative that decision makers understand how choosing a lower clean-up threshold affects waste generation and disposal costs. Is there a tool or method that can be used to estimate these values?

A suggestion would be to provide a toolkit, guidance or references which would provide a means to calculate parameters such as cost and volume of waste based on cleanup standards. One of the problems associated with the optimization process is that for large incidents there could be adjacent geopolitical areas that have established different clean-up standards. This will lead to confusion and possible litigation. It is imperative that there be some standards established ahead of time that states can reference in order to promote consistency in the process for decision making.

9. Basic planning guidance on approaching radioactive waste disposal is included. Please comment on this material and how it should be implemented in emergency response and recovery plans at all levels of government.

It is inappropriate for the guidance to state that the consideration and disposal of waste generated through cleanup efforts following a significant radiological event is a state and local decision and consideration. Based on the data made available from the Fukushima accident and considering the available waste storage capacity in the United States, it is unreasonable to think that state and local government agencies would be able to address this significant issue without assistance from the federal government.

Further, nuclear power plants are licensed by the NRC and states have little to no regulatory authority over radioactive materials, reactor fuel and spent fuel. Long term storage and disposal of high level radioactive waste from fixed nuclear facilities is the responsibility of the DOE. Weapons material and waste is a responsibility of the DoD and therefore, any contaminated waste generated by the use of an IND ought to be the property and responsibility of the DoD. Material and waste generated as part of a terrorist act may be considered evidence subject to control by federal law enforcement agencies. In evaluating the regulatory agencies and authorities for radioactive materials, it is inconceivable how EPA can consider radioactive waste solely a state and local issue.

In the United States, there is a significant issue regarding long term radioactive waste storage and the construction of a suitable site for a high level radioactive waste repository. Further, current storage facilities that accept low level radioactive waste have severely limited capacity in light of the waste that would be generated by a large scale nuclear event. With these considerations in mind, it is unreasonable to think that state and local governments would be able to site, construct and license a radioactive waste storage facility within state borders in sufficient time to be effective for the response. For states with high population densities, it may very well be impossible to site such a facility at all. Forlarge radiological events, it is likely that contamination will cross jurisdictional boundaries between states and perhaps even international borders. As one example, an Improvised Nuclear Device could be detonated by international terrorists and affect multiple states. The CRCPD and its members believe that the Federal Government bears the responsibility of protecting national security and as such bears the responsibility for waste disposal that would result from such acts.

A large release could lead to low-level waste volumes that are impossibile to store realistically. Standards need to be developed that ensure that the amount of low level waste generated can be accommodated at existing low level waste storage facilities. The states are not looking for theoretical solutions but practical and realistic solutions. The waste issue cannot be adequately addressed until cleanup criteria and disposal facilities are balanced. The EPA needs to have a more realistic approach to radiological waste disposal that identifies the resolution to the problem and establishes the challenge of radioactive waste disposal/management from a radiological disaster as a joint federal, state and local responsibility.

ATTACHMENT 2

ADDITIONAL COMMENTS FROM CRCPD
Manual of Protective Action Guides

Chapter 1

1. Table 1-1. Planning Guidance and Protective Action Guides for Radiological Incidents

The Early Phase of this Table lists the administration of prophylactic drug KI as a Protective Action Recommendation. The decision to stockpile and distribute KI to the public is a state and local decision and not all jurisdictions have decided to provide KI as part of their response. In order that the Administration of KI is not confused with other Protective Action Recommendations, it is recommended that it be considered a supplemental action for the public and not listed within this table. However, if the intent here is for the protection of emergency workers, it should be stated as such.

2. Page 9, 4th Paragraph

…(as in the case of an accident at an NPP)…

Changed to

…(as in the case of an accident at a NPP)…

3. Page 9, 4th Paragraph

The discussion of the late phase of an emergency introduces new terminology to the EPA document. The term "Reoccupancy" is introduced to describe what has been referred to in the past as "Return". If it is the intent of the EPA to introduce this term as the acceptable language for that action, it should be noted in **BOLD** and included in the glossary. It should also be noted within the text what term it will be replacing for clarity.

4. Page 9, Last Paragraph

The EPA is seeking input on the appropriateness of developing a short-term emergency water PAG. In Attachment 1 of this document, the CRCPD provided discussion regarding the development of a drinking water PAG. It would be appropriate to include that discussion here in the document and remove the final paragraph if the EPA accepts the suggestion.

5. Page 10, First Paragraph

The discussion within this relates to the National Primary Drinking Water Regulation. The regulatory standard of 4 mRem/year based on lifetime exposure is provided. It would be of greater value to have the assumptions for the standard more clearly defined here so that decision makers can better understand the application of this standard. It should clearly state here or, if appropriate, in other sections related to drinking water exactly what time frames (70 years) consumption (liters per day), mitigation strategies (none) etc. are used to calculate that value.

6. Page 10, Final Paragraph

The discussion of the late phase includes the following statement:

"The cleanup process described in Chapter 4, however, does not rely on and does not affect any authority, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq. and the National Contingency Plan (NCP), 40 CFR Part 300."

The intent and interpretation of this statement is unclear. Should we assume that, if during the late phase, a state chooses a clean-up value that is greater than the CERCLA standards, that EPA would exercise its authority to block this action? The intent of this statement needs to be more clearly defined.

Chapter 2

1. Page 16, Section 2.3.1

Spelling question. There are two different spellings within the paragraph for the same word: colocate and collocate. EPA can decide what is best but for the meaning and intent of the discussion it is found, co-locate would likely be the best spelling.

2. Page 17, Section 2.3.2

While the general discussion provides good information, the NRC/FEMA released an updated version of NUREG-0654, Supplement 3 that provides certain specific scenarios for Nuclear Power Plants where shelter in place for close in populations, followed by evacuation once other populations are evacuated, affords a dose reduction. This is referred to as staged evacuation. It might be worth at least acknowledging this within this document for consistency.

3. Page 17, 6th Bullet

- If a major release of radioiodine or particulate materials occurs, inhalation dose may be a controlling criterion for protective actions

The EPA has made the decision to remove the Thyroid dose from consideration for evacuation with a reasonable explanation. However, if the EPA believes that thyroid dose from inhalation can still be a controlling factor for Protective Actions then it should remain. We recognize that the committed dose to the thyroid (organ) and the inhalation dose to the lung from inhalation are separate calculations. However, unless there is an explanation of how it can be controlling for one (lung) and not for another (organ) will be difficult to justify the elimination of the PAG for the thyroid.

4. Table 2-6, Page 31

Are the levels indicated in this table consistent with FEMA guidance for NPPs? This should be checked for consistency.

Chapter 3

1. Page 35, 2nd Paragraph

The concept of "Avoided Dose" is introduced here in the document. The concept of avoided dose is not well understood nor clearly discussed in any other federal guidance document. It would be beneficial to users of this manual and to promote consistency in its application if there were a section within the document that discussed "avoided dose" and how that applies to decision making about PAGs. Terry Kraus (DOE) provided a good overview of the subject at the 2013 Annual Meeting of the Advisory Team. He can provide a good discussion of the topic if EPA believes that the discussion is appropriate for this document. The CRCPD believes that it would be useful.

2. Page 38, 3rd Bullet, Section 3.3.2

- People who were previously evacuated, but reside outside the relocation area and may now return home. A gradual return is recommended.

Since the discussion of this Chapter is for the Intermediate Phase and is limited in scope to the assessment and actions for relocation and dose reduction, the bullet that discusses return or "reoccupancy" is probably inappropriate for this section. While there is agreement that the Intermediate and Late Phases will overlap, in certain circumstances quite considerably, return discussions should be limited to Late Phase actions. It is appropriate for decision makers during this phase to concentrate on protective actions that will further reduce public exposure from residual contamination, from ingestion of contaminated food, water and milk and dose reduction from mitigation strategies. Including return considerations in this section may refocus efforts away from assessment of public health impacts.

3. See Attachment 1 for discussion and comments on the development of Water PAGs

Chapter 4

1. See Attachment 1 for a more detailed discussion of Late Phase Actions and Clean-up standards.

2. The document fails to discuss the turnover process from DOE to EPA for environmental monitoring and assessment. For the late phase discussion in Chapter 4, it is unlikely that the ICS/NIMS structure will remain in place for extended periods of time as assets are no longer required and appropriate controls are in place. We believe that more consideration be given to what the structure for command, control and decision making will look like over time. While there may still be elements in place, there will likely be significant changes over time.

3. While there is a great deal of discussion regarding waste, this document needs to recognize that the responsibility for waste does not fall to state and local government agencies. This is an impossible task for the federal government to tackle for the long term storage of waste, let alone the substantial quantities that will be generated following a large scale radiological incident. More consideration needs to be given to this section. At the very least it should clearly state that radioactive waste following an incident will be shared among state and federal agencies.

"Kathy Burns"
<kmb@sciencecorps.org>
09/16/2013 05:38 PM

To Group A-AND-R-DOCKET@EPA, Gina McCarthy/DC/USEPA/US@MSO365
cc
bcc
Subject Resubmission - correction to docket number

3 attachments

Docket EPA-HQ-AOR-2007-0268.doc Fundamental Flaws of Hormesis for Public Health Decisions in EHP 2005.pdf

Hormesis in Occ jnl.pdf

The docket number in the e-mail below sent at 4:38 should read EPA-HQ-OAR-2007-0268. Please direct this to the correct docket. Thanks.

From: Kathy Burns [mailto:kmb@sciencecorps.org]
Sent: Monday, September 16, 2013 4:38 PM
To: 'a-and-r-docket@epa.gov'; 'mccarthy.gina@epa.gov'
Cc: Michael Harbut (M1har@aol.com); James Huff (huff1@niehs.nih.gov); Ron Melnick
Subject: Docket ID No. EPA-HQ-OAE-2007-0268

September 16, 2013

To: US EPA Air and Radiation Docket, Washington, DC 20460
Convcycd via c-mail to: *a-and-r-docket@epa.gov* ; *mccarthy.gina@epa.gov*

Re: Docket ID No. EPA-HQ-OAR-2007-0268 regarding "Proposed guidance "PAG Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents"

To: Ms. Regina McCarthy, Administrator, US EPA

We oppose weakening radiation protection guidance in the PAG Manual and related policy actions. We urge you to avoid any reliance on concepts that do not adequately consider the range of susceptibilities inherent in populations and the need to strive for de minimis risk in all agency policies. We are submitting two peer-reviewed journal article that demonstrate fallacies inherent in the hormesis hypothesis in public health policy formulation and suggest a review of the many other journal articles that provide a critical review of this hypothesis.

Respectfully submitted,

Kathleen Burns, Ph.D. (Corresponding Author)
Director, Sciencecorps (KMB@Sciencecorps.Org)
Lexington MA

Michael R. Harbut, MD, MPH, FCCP
Professor of Internal Medicine Director, Environmental Cancer Program, Karmanos Cancer Institute, Wayne State University,
Detroit, Michigan

James Huff, Ph.D.
Former Chief IARC Monograph Program & Associate Director for Carcinogenesis at the National Toxicology Program, NIEHS (retired).
Research Triangle Park, NC,

Ronald Melnick, Ph.D.
National Toxicology Program, NIEHS (retired) and Ronald Melnick Consulting, LLC
New Haven, Connecticut.

A copy of this e-mail is attached in Word format for your convenience.

PILGRIM WATCH COMMENT PAG MANUAL MARCH 2013 DRAFT FOR INTERIM USE AND PUBLIC COMMENT

Mary Lampert
Pilgrim Watch, Director
148 Washington Street
Duxbury, MA 02332
Tel. 78`-934-0389
Email mary.lampert@comcast.net
July 9, 2013

TABLE CONTENTS

Introduction	1
Early-Intermediate-late Phase PAGs Meteorological Modeling Real-Time Offsite Radiological/Meteorological Monitors Environmental Sampling	2
Early-Intermediate-late Phase PAGs Planning Guidance and Protective Action Guide for Radiological Incidents	12
Early Phase PAGs Planning Guidance and PAGs Potassium Iodide Face Masks Reception Centers	15
Intermediate Phase PAGs Relocation Decontamination, Clean-up Drinking Water Standards	18
Late Phase PAGs Who is in Charge Who Pays	27

PILGRIM WATCH COMMENT PAG MANUAL (MARCH 2013) DRAFT FOR INTERIM USE AND PUBLIC COMMENT [Docket ID No. EPA-HQ-OAR-2007-0268]

July 9, 2013

I. INTRODUCTION

EPA's Draft PAG provides radiological protection criteria (PAGs and protective actions) for application to all incidents that would require consideration of protective actions, with the exception of nuclear war.

The PAG says that the "PAGs are not legally binding regulations or standards and do not supersede any environmental laws." However state and local responders treat the Manual as the Gospel and this should be recognized.

The Draft PAG Manual should make clear, but does not, what specific regulations or standards require beside the PAG Manual Guidance. A simple table should be included in the final document laying out side by side the PAGs and all other pertinent standards, as opposed to only footnotes providing links to those standards, as in the draft.

The PAG Manual divides into three sections: Early Phase Protective Action Guides; Intermediate Phase Protective Action Guides; and Late Phase Protective Action Guides. EPA's draft largely provides simply a broad-brushed description of radiological emergency plans at each stage; and not enough attention is given to what the plans <u>should be</u> in order to reflect lessons learned from Fukushima and to protect public health and the environment. The EPA Draft Manual guidance is inadequate in the following areas.

- Meteorological plume modeling, real-time offsite radiological air monitors, environmental sampling
- Dose Guidance
- Potassium Iodide
- Cleanup

II. METEOROLOGICAL PLUME MODELING; REAL-TIME OFFSITE RADIATION/METEOROLOGICAL AIR MONITORING STATIONS; ENVIRONMENTAL SAMPLING - EARLY, INTERMEDIATE, LATE PHASE PROTECTIVE ACTION GUIDANCE

The PAG Manual provides radiological protection criteria for application to all incidents that would require consideration of protective actions. In order to make the correct protective action call (evacuate, shelter, administration KI, interdiction of food/milk/water) and properly assess what areas require cleanup and population relocation requires:

- advanced and site-appropriate meteorological plume models;
- the availability of real -time meteorolo gical/radiological monitors located in the near and far field; and
- Timely and reliable environmental monitoring.

The PAG Draft Manual does not, as it should provide proper specific guidance in these three areas.

A. Meteorological Plume Modeling- Outdated Gaussian Model v. Advanced Variable Models

The EPA Draft PAG missed the opportunity to plainly state that advanced meteorological models[1] should be used. The draft dances around the issue but never comes straight out with a definite recommendation, as it should in the final PAG Manual.

a. Today, the out -dated straight-line Gaussian plume is used by licensees and federal/state emergency planners. It will not provide the information required to make correct protective action decisions. The Gaussian plume model assumes that a release d radioactive plume travels in a steady-state straight-line, i.e., the plume functions much like a beam from a flashlight. The choice of a straight -line Gaussian plume rather than a variable trajectory model drastically reduces, to a wedge, the size of th e area that might potentially be impacted by a release. It has been known by government and independent agencies for a long time that the assumption of a steady-state, straight -line plume is inappropriate when complex inhomogeneous wind flow

[1] See Draft PAG at, fr example pgs., 13,21,22,23,24,37,40

ED_001057_00026684

patterns happen to be prevailing in the affected region – such as in hilly and mountainous terrain, along rivers that channel the plume and along wide bodies of waters where, for example, the sea breeze effect occurs.

Sea breeze : There is a misconception that the sea b reeze is generally a highly beneficial phenomenon that disperses and dilutes the plume concentration and thereby lowers the projected doses downwind from the release point. However, if the same meteorological conditions (strong solar insolation, low synoptic-scale winds) that are conducive to the formation of sea breezes at a coastal site occurred at a non coastal location, the resulting vertical thermals developing over a pollution source would carry contaminants aloft. In contrast, at a coastal site, th e sea breeze draws contaminants downward across the land and inland subjecting the population to larger doses and at greater distance.

Behavior Plumes over Water : Also Planning should, but does not, reflect understanding of the flow of air over and arou nd large bodies of water. As an example at Pilgrim, located on New England's Coastline, winds initially headed out to sea will remain tightly concentrated due to reduced turbulence over water until the winds blow the puffs back over land. [2] This can lead to hot spots of radioactivity in unexpected places – beyond 10 miles that should be instructed and prepared to take protective actions.

Meteorological Modeling: Government and Independent Studies

EPA has been a leader in advanced meteorological studies. Al so other government and independent studies support that a straight line Gaussian plume model cannot account for the effects of complex terrain on the dispersion of pollutants from a source. Therefore the final EPA PAG should make this clear – not simply ignore or skirt the issue.

---

[2] Zager M, Tjernstrom M, Angevine W. 2004, New England coastal boundary layer modelin g. In: AMS 16th Symposium on boundary Layers and Turbulence, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Senff CJ, White AB. 2004. Coastal Boundary layer Transport of urban pollution in New England In: 16th Symposium of boundary layers and tur bulence Portland, Maine, 13th Symposium on Turbulence and diffusion, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Zager M. 2006. Modeling of the Coastal Boundary Layer and Pollutant Transport in New England, J. of Appl. Meteorol. & Climatol. 4 5: 137-154. Scire JS, Strimaitis DG, Yamatino RJ. 2000 A User's Guide for the CALPUFF Dispersion Model (Version 5). Concord MA: Earth Tech, Inc.

ED_001057_00026684

EPA

EPA recognized the need for complex models. For example: EPA's 2005 Guideline on Air Quality Models says in Section 7.2.8 *Inhomogenous Local Winds* that,

> In very rugged hilly or mountainous terrain, along coastlines, or near large land use variations, the characterization of the winds is a balance of various forces, such that the assumptions of steady-state straight line transport both in time and space are inappropriate. (Fed. Reg., 11/09/05).

EPA goes on to say that, "In special cases described, refined trajectory air quality models can be applied in a case-by-case basis for air quality estimates for such complex non-steady-state meteorological conditions." This EPA Guideline also references an EPA 2000 report, *Meteorological Monitoring Guidance for Regulatory Model Applications,* EPA-454/R-99-005, February 2000. Section 3.4 of this Guidance for coastal locations, discusses the need for multiple inland meteorological monitoring sites, with the monitored parameters dictated by the data input needs of particular air quality models.

Most important, EPA's November 2005 Modeling Guideline (Appendix A to Appendix W) lists EPA's "preferred models" and the use of straight line Gaussian plume model, called ATMOS, is not listed. Sections 6.1 and 6.2.3 discuss that the Gaussian model is not capable of modeling beyond 50 km (32 miles) and the basis for EPA to recommend CALPUFF, a non-straight line model.[3]

NRC

Since the 1970s, the USNRC too has historically documented advanced modeling technique concepts and potential need for multiple meteorological towers appropriately located in offsite communities, especially in coastal site regions. But ignored implementing its' own advice.

[3] http://www.epa.gov/scram001/guidance/guide/appw_05.pdf

ED_001057_00026684

In 2009, the NRC made a presentation to the National Radiological Emergency Planning Conference;[4] and although it was focused on emergency planning, the content is equally relevant to meteorological modeling for consequence analysis. The presentation concluded that the straight-line Gaussian plume models cannot accurately predict dispersion in a complex terrain and are therefore scientifically defective for that purpose [full presentation is available at ML091050226, ML091050257, and ML091050269 (page references used here refer to the portion attached, Part 2, ML091050257). Exhibit 19

Most reactors, if not all, are located in complex terrains, including Pilgrim. In the presentation, NRC said that the "most limiting aspect" of the basic Gaussian Model, is its "inability to evaluate spatial and temporal differences in model inputs" [Slide 28]. Spatial refers to the ability to represent impacts on the plume after releases from the site e.g., plume bending to follow a river valley or sea breeze circulation. Temporal refers to the ability of the model to reflect data changes over time, e.g., change in release rate and meteorology [Slide 4].

Because the basic Gaussian model is non-spatial, it cannot account for the effect of terrain on the trajectory of the plume – that is, the plume is assumed to travel in a straight line regardless of the surrounding terrain. Therefore, it cannot, for example, "'curve' a plume around mountains or follow a river valley." NRC 2009 Presentation, Slide 33. Entergy acknowledges that within 50-miles from Pilgrim there are hills and river valleys. Further it cannot account for transport and diffusion in coastal sites subject to the sea breeze. Sea breeze also applies to any other large bodies of water. The sea breeze causes the plume to change direction caused by differences in temperature of the air above the water versus that above the land after sunrise. If the regional wind flow is light, a circulation will be established between the two air masses. At night, the land cools faster, and a reverse circulation (weak) may occur [Slide 43]. Turbulence causes the plume to be drawn to ground level [Slide 44].

The presentation goes on to say that, "Additional meteorological towers may be necessary to adequately model sea breeze sites" [Slide 40].

[4] What's in the Black Box Known as Emergency Dose Assessment (ML091050226), 2. Dispersion (ML091050257), 3. Dose Calculation (ML091050269), 2009 National Radiological Emergency Planning Conference, Stephen F. LaVie

ED_001057_00026684

Significantly, the NRC 2009 Presentation then discussed the methods of more advanced models that *can* address terrain impact on plume transport, including models in which emissions from a source are released as a series of puffs, each of which can be carried separately by the wind, (NRC 2009 Presentation Slides 35, 36). This modeling method is similar to CALPUFF. Licensees are not required, however, to use these models in order to more accurately predict where the plume will travel to base either consequence analyses or protective action recommendations.

The NRC recognized as early as 1977 that complex terrain presented special problems that a model must address if the air dispersion analysis is to be accurate. [5] For example: NRC, Regulatory Guide 1.111, *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light -Water-Cooled Reactors* (July 1977) (Draft for Comment) says that, "Geographic features such as hills, valleys, and large bodies of water *greatly* influence dispersion and airflow patterns. Surface roughness , including vegetative cover, affects the degree of turbulent mixing." (Emphasis added).

<u>This is not new information; knowledge of the inappropriateness of straight-line Gaussian plume in at complex sites goes back a long way within NRC. For example:</u>

1972: NRC Regulatory Guide 123 (Safety Guide 23) On Site Meteorological Programs 1972, states that, "at some sites, due to complex flow patterns in non -uniform terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary."

1977: NRC began to question the feasibility of using straight line Gaussian plume models for complex terrain. *See* U.S.NRC, 1977, Draft for Comment Reg. Guide 1.111 at 1c (pages 1.111 -9 to 1.111-10)

1983: In January 1983, NRC Guidance [NUREG-0737, Supplement 1 "Clarification of TMI Action Plan Requirements," January 1983 Regulatory Guide 1.97 - Application to Emergency Response Facilities; 6.1 Requirements], suggested that changes in on -site meteorological monitoring systems would be warranted if t hey have not provided a reliable indication of monitoring conditions that are representative within the 10-mile plume exposure EPZ.

[5] Ibid

ED_001057_00026684

1996: The NRC acknowledged the inadequacy of simple straight -line Gaussian plume models to predict air transport and disper sion of a pollutant released from a source in a complex terrain when it issued RTM -96, *Response Technical Manual,* which contains simple methods for estimating possible consequences of various radiological accidents. In the glossary of that document, the NR C's definition of "Gaussian plume dispersion model" states that such models have important limitations, including the inability to "deal well with complex terrain." NUREG/BR-0150, Vol.1 Rev.4, Section Q; ADAMS Accession Number ML062560259,

2004: A NRC rese arch paper, *Comparison of Average Transport and Dispersion Among a Gaussian, A Two- Dimensional and a Three-Dimensional Model*, Lawrence Livermore National Laboratory, October, 2004 at 2. ("Livermore Report") had an important caveat added to the Report's summary about the scientific reliability of the use of a straight -line Gaussian model in complex terrains:

> . . . [T]his study was performed in an area with smooth or favorable terrain and persistent winds although with structure in the form of low -level noc turnal jets and severe storms. In regions with *complex terrain* , particularly if the surface wind direction changes with height, *caution should be used.* Livermore Report at 72 (Emphasis added)

2005: In December, 2005, as part of a cooperative program betwe en the governments of the United States and Russia to improve the safety of nuclear power plants designed and built by the former Soviet Union, the NRC issued a Procedures Guide for a Probabilistic Risk, related to a Russian Nuclear Power Station. The Guid e, prepared by the Brookhaven National Laboratory and NRC staff, explained that atmospheric transport of released material is carried out assuming Gaussian plume dispersion, which is "generally valid for flat terrain." However, the Guide the caveat that in "specific cases of plant location, such as, for example, a mountainous area or a valley, more detailed dispersion models may have to be considered." *Kalinin VVER -1000 Nuclear power Station Unit 1 PRA, Procedures Guide for a Probabilistic Risk Assessment,* NUREG/CR- 6572, Rev. 1 at 3 -114; excerpt attached as Exhibit 8, full report available at http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6572. Exhibit 20

ED_001057_00026684

2007: NRC revised their Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants. On page 11, the section entitled *Special Considerations for Complex Terrain Sites* says that, "At some sites, because of complex flow patterns in nonuni form terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary. For example, the representation of circulation for a hill-valley complex or a site near a large body of water may need additional measuring poin ts to determine airflow patterns and spatial variations of atmospheric stability. Occasionally, the unique diffusion characteristics of a particular site may also warrant the use of special meteorological instrumentation and/or studies. The plant's operational meteorological monitoring program should provide an adequate basis for atmospheric transport and diffusion estimates within the plume exposure emergency planning zone [i.e., within approximately 16 kilometers" (10 miles)].[6]

These excerpts from Regula tory Guide 1.23 demonstrate that the NRC recognizes there are certain sites, such as those located in coastal areas, like Pilgrim, that multiple meteorological data input sources are needed for appropriate air dispersion modeling. Not simply one or two meteorological towers onsite. Since the straight -line Gaussian plume model is incapable of handling complex flow patterns and meteorological data input from multiple locations, Regulatory Guide 1.23 demonstrates NRC's recognition that it should not be used at any site with complex terrain.

DOE

DOE, too, recognizes the limitations of the straight -line Gaussian plume model. They say for example that Gaussian models are inherently flat-earth models, and perform best over regions of transport where there is minima l variation in terrain. Because of this, there is inherent conservatism (and simplicity) if the environs have a significant nearby buildings, tall vegetation, or grade variations not taken into account in the dispersion parameterization.[7]

[6] For example, if the comparison of the primary and supplemental meteorological systems indicates convergence in a lake breeze setting, then a "keyhole" protective action recommendation (e.g., evacuating a 2-mile radius)
[7] the MACCS2 Guidance Report June 2004 Final Report, page 3-8:3.2 Phenomenological Regimes of Applicability

ED_001057_00026684

National Research Council

Tracking and Predicting The Atmospheric Dispersion of Hazardous Material Releases Implications for Homeland Security, Committee on the Atmospheric Dispersion of Hazardous Material Releases Board on Atmospheric Sciences and Climate Division on Earth and Life Studies, National Research Council of the National Academies, 2003. The report discusses how the analytical Gaussian models were used in the 1960s and tested against limited field experiments in flat terrain areas performed in earlier decades.

In the 1970s the US passed the Clean Air Act which required the use of dispersion models to estimate the air quality impacts of emissions sources for comparison to regulatory limits. This resulted in the development and testing of advanced models for applications in complex terrain settings such as in mountainous or coastal areas. In the 1980s, further advances were made with Lagrangian puff models and with Eulerian grid models. Gaussian models moved beyond the simple use of sets of dispersion coefficients to incorporate Monin-Obukhov and other boundary layer similarity measures which are the basis of contemporary EPA models used for both short range and long range transport applications. Helped enormously by advances in computer technologies, in the 1990s, significant advances were made in numerical weather prediction models and also further improve dispersion models through the incorporation of field experiment results and improved boundary layer parameterization. The decade starting with the year 2000 has seen improved resolution of meteorological models such as MM5 and the routine linkage of meteorological models with transport and dispersion models as exemplified by the real time forecasts of detailed fine grid weather conditions available to the public at Olympic events. Computational Fluid Dynamics (CFD) models which involve very fine grid numerical simulations of turbulence and fluid flow began to see applications in atmospheric dispersion studies. The next decade will see routine application of CFD techniques to complex flows associated with emergency response needs.

The nuclear industry does not show evidence of keeping up with these technological advances. For use in modeling air quality concentrations, the NRC uses straight-line Gaussian dispersion algorithms that date back to the 1960s. EPA should, but does not, advocate in the draft keeping up with these technological advances. Complex flow situations such as those associated with flow around high terrain features or that would incorporate sea breeze circulations are not

ED_001057_00026684

simulated. For emergency response applications, the EPA, unlike NRC, should be advocate of advanced modeling to be installed at nuclear power plants.

Atmospheric Scientists & Meteorologists

For over three decades atmospheric sci entists and meteorologists have been identifying problems in the use of models similar to ATMOS for such settings. Example: Steven R. Hanna, Gary A. Briggs, Rayford P. Hosker, Jr., National Oceanic and Atmospheric Administration, Atmospheric Turbulence an d Diffusion Laboratory, *Handbook on Atmospheric Diffusion* (1982)).

The inability of a simple Gaussian plume model to accurately predict air transport and dispersion in complex terrains is such a basic flaw that it is discussed in a textbook for a college - level introductory course in environmental science and engineering (Steven R. Hanna, Gary A. Briggs, Rayford P. Hosker, Jr., National Oceanic and Atmospheric Administration, Atmospheric Turbulence and Diffusion Laboratory, *Handbook on Atmospheric Diffusion* (1982)). (Chapter 13 authored by William J. Moroz). In listing the assumptions that are made to develop a simple straight line Gaussian plume model, the textbook warns that:

The equation is to be used over relatively flat, homogeneous terrain. It should not be used routinely in coastal or mountainous areas, in any area where building profiles are highly irregular, or where the plume travels over warm bare soil and then over colder snow or ice covered surfaces

B. Real-Time Offsite Radiation/Meteorological Air Monitoring Stations

The EPA Final PAG needs to emphasize in clear language the need for robust real -time monitoring data to help address the question of what was emitted, over what timeframe, where it went thereafter, and what did it do or not do to the surrounding public. The importance is threefold:

(1) Fore-casting (ahead of time, as a tool for emergency planning tool for pre-planning). Where would a plume likely go under various typical weather regimes, and what and where could be the resultant concentrations/potential doses?

ED_001057_00026684

(2) Now-casting (during a radiological emergency). Where is the plume actually going, and what are the resultant concentrations/potential doses - for making appropriate recommendations (i.e., evacuate or shelter in place)?

(3) Hind-casting (the post -radiological emergency timeframe) – Combining meteorological modeling with expanded meteorological/radiological data to provide for more accurate/realistic dose estimates can help with disaster recovery, clean -up, litigation resolution, and short -term acute and long-term epidemiological health studies.

Multiple Meteorological Towers Importance Recognized Since the 1970's

Since the 1970s, the USNRC has historically documented all the advanced modeling technique concepts and pote ntial need for multiple meteorological towers especially in coastal regions. NRC Regulatory Guide 123 (Safety Guide 23) On Site Meteorological Programs 1972, states that, "at some sites, due to complex flow patterns in non -uniform terrain, additional win d and temperature instrumentation and more comprehensive programs may be necessary]; and an EPA 2000 report, Meteorological Monitoring Guidance for Regulatory Model Applications, EPA-454/R-99-005, February 2000, Sec 3.4 points to the *need for multiple inla nd meteorological monitoring sites.* See also Raynor, G.S.P. Michael, and S. SethuRaman, 1979, Recommendations for Meteorological Measurement Programs and Atmospheric Diffusion Prediction Methods for Use at Coastal Nuclear Reactor Sites. NUREG/CR-0936.

C. Environmental Sampling/Monitoring

The Draft PAG recognizes that dose projections are useful for initiating protective actions in the early phase but there is uncertainty prior to confirmatory field measurements because of unknown factors affecting environmental pathways, inadequacies of modeling and uncertainty in the data for release terms. (Draft, pg., 22) However what is not acknowledged are the limits of field measurements due to lack of funds and sufficient staff to perform the field measurements in a timely manner. Also the PAG does not indicate specifics such as how deep in the soil samples should be taken nor how often the samples should be repeated in the same area to account for resuspension or aqueous discharges and runoff.

ED_001057_00026684

III. PLANNING GUIDANCE AND PAGS (DRAFT, PG., 7)

Decisions regarding protective actions depend on dose response guidance. Whether the dose-response guidance is based on the best science on radiation health effects available today will determine whether the protective actions are protective of human health. Unfortunately the Draft PAGS are based on old science and out-of-date meaning the public will be harmed unnecessarily not protected.

Pilgrim Watch incorporates herein the testimony in full presented by Dr. Daniel Hirsch, Committee to Bridge the Gap, California. Highl ights of what is wrong with the PAGS and how EPA is abdicating its responsibility to protect public health include, for example:

1. EPA eliminates the existing requirements from the 1992 PAGs triggering evacuation when thyroid or skin doses exceed specified limits.
2. EPA eliminates the existing relocation limit of 5 rem cumulative dose over 50 years, saying it might conflict with their long -term cleanup approach, which in the new associated guidance from NCRP would allow cumulative 50 -year doses of 100 rem, twenty-fold higher. Even thirty years exposure at the 2 rem/year figure would, by EPA's own official risk estimates, result in an excess cancer in every eighth person exposed ; orders of magnitude higher risk than EPA has ever considered acceptable.
3. EPA incorrectly argues that relaxed long-term standard is somehow justified because the public's exposure will not be for 70 years. But this is a disingenuous argument. The core of the long-term cleanup part of the PAGs is setting a very high permissible annual dose that one would be allowed to get for a whole lifetime (indeed, the standard 70 year lifetime assumption) without the government having to cleanup at all. The one-year exposure is for the intermediate phase; the long-term phase is forever, and that is what is so troubling about relaxing long-term cleanup standards.
4. EPA says that the Safe Drinking Water Act Maximum Contaminant Limits (MCLs) may not be appropriate and propose five alternatives far more lax , and does so in footnotes. Those proposed weaker l imits would allow concentrations of radionuclides in drinking water orders of magnitude higher than considered safe by EPA under the Safe Drinking Water Act. I have attached two tables Dr. Hirsch put together comparing these levels for four key radionucli des. Their proposals are frequently as bad as the Bush water PAG

ED_001057_00026684

proposal and in some cases worse. Generally, they are proposing allowing hundreds to tens of thousands of times higher concentrations of radioactivity in drinking water than EPA has historically allowed as safe under the Safe Drinking Water Act.

Obama Drinking Water PAG proposals vs. Existing EPA Safe Drinking Water Levels and Bush Administration PAG Proposal
units = Bq/L

Radionuclide	EPA Safe Drinking Water Act Maximum Contaminant Limit (MCL)	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	0.111	314	314	3000	170	10	300
Strontium-90	0.296	246	246	200	160	10	
Cesium-137	7.4	503	503	2000	1200	10	
Plutonium-239	0.555	27	27	50	2	1	

Factors by Which Obama Drinking Water PAG Proposals Would Exceed Existing EPA Safe Drinking Water Levels

Radionuclide	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	2829	2829	27027	1532	90	2703
Strontium-90	828	828	676	541	34	
Cesium-137	68	68	270	162	1.35	
Plutonium-239	49	49	90	3.6	1.8	

Note: Second vertical column, "Obama proposed Drinking Water Page" should read PAGs not Page

5. EPA incorporates 1998 guidance allowing extremely high contamination of food, despite internal EPA criticism of doing so which said it would produce a cancer in every fiftieth person so exposed.
6. EPA incorporates the DHS PAGs for dealing with long-term cleanup from a nuclear weapons explosion and applies it to any kind of release. The DHS PAG is based on "optimization" and contemplated permitting long-term doses as high as several rem per year. The new PAG is tied to the NCRP new guidance which would allows doses up to 2 rem per year over a lifetime (the equivalent of about 1000 extra chest X-rays every year, or 3 X-rays every day of your life from birth to death). EPA's estimate of a 70-year

ED_001057_00026684

lifetime exposure at that level would be one in every six people exposed would get a cancer (the risk coefficient they use is different for exposure over a lifetime than for earlier years because of the elevated risk at younger ages

7. The associated NCRP guidance on implementing the PAGs for long term cleanup recommends radionuclide concentration levels so high that they would allow concentrations for strontium-90, for example, hundreds of thousands of times higher than the EPA's official Preliminary Remediation Goals for the same exposure scenarios. They would produce cancer risks using EPA's risk figures in the several cancers per ten people exposed, orders of magnitude outside the long-held acceptable risk range.
8. In essence, the PAGs and the documents associated with them are saying nuclear power accidents could be so widespread and produce such immense radiation levels that the government would simply abandon most cleanup obligations and force people to live with exposures so high that extremely large fractions of the exposed population would get cancer from the exposure.
9. Troubling in a different fashion, EPA buries the "bad stuff" in footnote references to a whole series of other documents so it is hard for a lay reader to see the troubling things EPA has done. EPA thereby has made the PAG manual itself essentially useless in a real accident. It was supposed to be a stand-alone, clear document that a first-responder could take off the shelf, look up a table in it, see if a radiation level exceeded a PAG and if so undertake the protective action described therein. But all of that is now removed from the PAG document. Instead, there are footnotes to URLs for numerous referenced documents, most of which are contradictory, so that the PAG does not achieve its intention that is to be useful in providing some guidance.

Furthermore, EPA is statutorily mandated to produce the PAGs and other radiation guidance for the rest of the federal family and historically has viewed DOE and NRC as not sufficiently protective in radiation matters. The PAG now abdicates EPA's responsibility to come up with guidance and instead references almost exclusively documents from DOE that EPA has historically opposed. For example, it now directs the use of DOE's Operational Guidance document which uses cleanup concentrations hundreds of thousands of times higher than EPA's official concentrations. Rather than

ED_001057_00026684

use its own conversions from conce ntration to risk, EPA now defaults to DOE's models, documents, and values with which it has long disagreed as technically not defensible and not sufficiently protective. But at the end of the day, no emergency responder will have a Protective Action Guide that is useable. If it were used, however, it would allow doses to the public so far outside the range ever considered acceptable as to be deeply disturbing.

IV. EARLY PHASE PROTECTION ACTION GUIDANCE

The Draft PAG's guidance is insufficient or incorrect for: dose that triggers evacuation, discussed above; potassium iodide; omission of the importance of stockpiling 3-M face masks; and apparent confusion over the requirement for, and role of, Reception Centers.

Potassium Iodide, KI (Draft Section 2.3.4)

KI is FDA approved: It is stockpiled around the world and recommended by experts such as: the World Health Organization; the National Academies of Sciences [8] that acknowledged KI's efficacy and that it may be necessary beyond 10 -miles; American Thyroid Associati on; the International Atomic Energy Agency; President Carter's Kemeny Commission; Federation of American Physics; U.S. Public Interest Group. Although adverse reactions are possible, but rare, to those allergic to iodine; however, unlike exposures to radia tion, no long term negative effects or fatalities are on record.

Contrary to FDA and the above listed organizations, the EPA PAG improperly blows out of proportion KI's supposed contraindications, indicating a strong bias to discourage its use – politics over science. For example, EPA says that:

> Some people should not take KI . As a rule, individuals with known allergy to iodine or with pre-existing thyroid disease (e.g., Graves' disease, thyroid nodules, Hashimoto's thyroiditis) that might predispose th em to adverse reactions should avoid KI. (Draft, pg., 20)

FDA, in contrast, says that individuals with known allergy to iodine or with pre-existing thyroid disease should be treated with caution; EPA says that they "should avoid KI.

[8] *Distribution and Administration of Potassium Iodide in the Event of a Nuclear Incident, 2004*

ED_001057_00026684

KI-Time Sensitive: The Draft EPA Guidance avoided to make clear[9] that because KI is time sensitive, it must be stockpiled ahead of time and taken so that it can be administered at the earliest possible time. The Final PAG needs to correct this omission.

Distance to Stockpile K I: The Draft makes no recommendation or mention of the distance from reactors that KI should be stockpiled. The Bioterrorism Act's Section 127, for example, called for stockpiling KI out to 20 miles from a reactor site. It was never implemented for purely political reasons despite the fact that NRC stockpiles KI for its employees.

The reason to provide KI in the 10 -20 mile zone is because of the possibility of inhalation during an accident of significant consequence. For example, Dr. Temeck (FDA representa tive to NRC's KI Core Group Meeting, Tempe Arizona, March 4, 1999) stated that exposure to children after Chernobyl resulted from "a combination of inhalation and ingestion."

NRC's NUREG-1633 points out that radioactive iodide can travel hundreds of mil es on the winds. An increase in cancer caused by Chernobyl was detected in Belarus, Russia and Ukraine. Notably, this increase, seen in areas more than 150 miles from the site, continues to this day and primarily affects children who were 0-14 years old at the time of the accident…the vast majority of the thyroid cancers were diagnosed among those living more than 31 miles from the site. The 2001 figures showed 11,000 thyroid cancers at 31 miles. Again, "Exposure to children after Chernobyl resulted from "a combination of inhalation and ingestion."

NRC's NUREG/CR 1433 said that for children, the following dangers might occur from the inhalation of nuclear materials after a massive core-melt atmospheric accident (like Chernobyl):

Approximate Dangers of a Core-Melt Atmospheric Accident for Children

Distance in Miles	Mean Thyroid Dose (rem) for Exposed Children Outdoors*	Probability of Thyroid Damage to Exposed Children Located Outdoors if not Protected by Stable Iodine (like KI)
1	26,000	100%
5	11,600	100%

[9] See Draft PAG, for example, at pgs19-20, 33

ED_001057_00026684

10	6,400	100%
25	2,200	80%
50	760	26%
100	200	7%
150	72	2%
200	32	1%

Therefore EPA's Final PAG should advocate stockpiling KI to at least 20 miles, and that both the Federal Government [10] and states have KI stockpiles located so as to provi de KI in a timely manner to those without it.

Pilgrim Watch incorporates in full the comments on Potassium Iodide submitted on this docket by Peter Crane, Seattle Washington.

Face Masks

The PAG says that "breathing air filtered through common household it ems (e.g., folded handkerchiefs or towels) may help reduce exposures from contamination on the ground. (General Guidance for Evacuation and Sheltering in pace, pg., 17) Instead, PW recommends that the Final EPA PAG recommends stockpiling face masks in publ ic shelters, schools; and that emergency planners include face masks in their public education literature. The PAGs advice is not practical for school children and the rest of the public for that matter. Imagine a mother leaving a shelter with two small ch ildren to drive to the Reception Center for monitoring, decontamination and relocation instructions. How possibly can she drive and cover her and her children's mouths? Also, masks may be useful inside shelter locations, because shelters cannot be 100% eff ective in eliminating dose. The basic 3-M (N-95) type masks screen out >0.1 microns and are inexpensive. They come in child and adult sizes.

[10] The U.S. Strategic National Stockpile stopped purchasing KI (Washington Post, April 7, 2011)

ED_001057_00026684

Reception Centers- Monitoring & Decontamination

Section 2.31 says that "A decontamination Station, with simple d econtamination actions, may need to be collocated at shelters during the pre -evacuation period." The language is confusing for reactor accidents. Radiological emergency plans for nuclear reactors require Reception Centers located outside the EPZ. NUREG -0654, J-12 says that Reception Centers shall monitor 100% of the population within 12 hours. Therefore the Reception Centers must be equipped with sufficient monitors (portal and hand monitors), have capability to decontaminate as required, and provide towe ls and clothing or coveralls for the public to wear after decontamination. The Final PAG must make this clear.

Similarly, Radiological Emergency Workers Monitoring and Decontamination Stations must be located outside the EPZ and equipped to monitor and decontaminate.

Vehicles arriving at the Reception Centers or REWMDS also must be wiped down so as not to spread contamination to clean areas. The PAG is silent on REWMDS.

V. INTERMEDIATE PHASE (CHAPTER 3)

The Draft says that "The principal protective actions fo r reducing exposure of the public to deposited radioactive materials are relocation, decontamination and time limits of exposure."

A. Relocation

The Draft says that relocation should be based on 2 rem (2,000 millirem) over the first year of exposure and afte r the first year, the PAG relocation standard is 0.5 rem (500 millirem). (Draft, pgs., 7, 50)

The PAG **eliminates the existing relocation limit of 5 rem cumulative dose over 50 years, saying it might conflict with their long -term cleanup approach**, which in the new associated guidance from NCRP would allow cumulative 50-year doses of 100 rem, twenty-fold higher. Even thirty years exposure at the 2 rem/year figure would, by EPA's own official risk estimates, result in an excess cancer in every eighth person exposed; orders of magnitude higher risk than EPA has ever considered acceptable

ED_001057_00026684

B. Decontamination & Cleanup

The key points to reduce exposure of the public in both the intermediate and late phase are not properly addressed. They include, for example:

- Meteorological modeling with expanded meteorological/radiological data to provide for more accurate/realistic dose estimates that can help with disaster recovery, clean -up (discussed in the foregoing);
- Capability to decontaminate - hosing buildings and plowi ng under fields does not decontaminate but simply moves the contamination from one place to another;
- Waste disposal, admitted to be impossible in a severe reactor accident but shifting responsibility to the state and local community is not the answer, either; and
- Updated dose estimates based on BEIR VII and geared to the most vulnerable -women and small children.
- Avoided is a discussion of what federal agency is in charge and who pays.

DECONTAMINATION/CLEANUP- NOT PROPERLY ADDRESSED

The EPA Draft never ch allenges current NRC/FEMA assumptions reflected in NRC's consequences models that:

- Underestimates both the size of the area likely to be contaminated, and the extent of contamination.
- Underestimates how long cleanup and decontamination will take.
- Ignores that forests, wetlands, and bodies of water essentially cannot be cleaned up or decontaminated and in turn runoff will re-contaminate cleaned areas.
- Ignores that the technologies needed for cleanup have not even been developed.
- Underestimates the huge vol ume of waste; and slides over the fact that there are no available disposal options.
- Ignores there is not even a clear-cut cleanup standard -guidance not regulation.
- Assumptions are based on estimates of what is required for nuclear weapon cleanup, rather than the very different problems presented by nuclear reactor accident - micron size and volume.

ED_001057_00026684

- Minimizes consequences by assuming a straight -line Gaussian plume model, ignoring aqueous discharges, and ignoring that an accident can persist over many weeks and months.
- Underestimates the time that decontamination will take. Technologies to cleanup have not been developed; current cleanup methods used in Japan and assumed in US models do not work- hosing down buildings and plowing under fields. They are based on nuclear weapons cleanup that is a different from cleanup after a nuclear reactor accident. Many radionuclides, like Cs-137, have long half-lives.

The Contaminated Area

The cost of cleanup fundamentally reflects the size of the area contaminated, and the level of contamination. A year ago, the Japanese press reported that the Fukushima accident contaminated 13,000 square kilometers (an area nearly equivalent to the size of Connecticut (land area and water). The contaminated area extended in all directions and at considerable distance from the site. [11] The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) map showed the spread of radiation from Fukushima across 10 prefectures, including Tokyo and Kanagawa. [12] Also so far as Pilgrim Watch (hereinafter "PW") knows, no one has even attempted to calculate how much of the Pacific Ocean and connecting waters have been contaminated by aqueous discharges and those impacts on the size of the area contaminated, impact on cleanup and human health from consuming fish and seafood.

Beyond "how large an area," is the question of "how contaminated?" The level of contamination in the affected areas depends on both the size of the release at any point in time, and also on its duration. The Fukushima release has continued for months.

The basic lesson to be learned from these simple facts is that any remotely adequate consequence analysis must take into account the very real likelihood of a large level release that

[11] *Estimated 13,000 square km eligible for decontamination* Asahi.com (Asahi Shimbun), Oct 12, 2011
[12] Mainichi News, http://mdn.mainichi.jp/mdnnews/news/20111007p2a00m0na009000c.html; Gov't radiation info in English http://radioactivity.mext.go.jp/en/

ED_001057_00026684

continues for a long period of time and contaminates many thousands of square miles. The EPA Draft and current NRC economic analyses unrealistically limit the duration of the radioactive release, the size of the affected area, and the radiation source.

- Duration: The Fukushima disaster persisted over many months. But the EPA Draft and NRC approved consequence code, MACCS2, limits the total duration of a radioactive releases to no more than four (4) days, if the user chooses to use four plumes occurring sequentially over a four day period.[13] A longer release such as that at Fukushima will cause offsite consequences that will increase contamination, and result in required re-decontamination, and significantly increase cleanup costs and the overall cost-benefit analyses.
- Size of Affected Area. How large an area will be contaminated, and where that area is likely to be, depends on assumptions made about the radioactive plume. Fukushima showed that the plume did not travel simply in a straight-line.[14] Fukushima also showed that releases can extend for weeks and months and thereby the plumes will travel in variable directions. Rascal also assumes a Gaussian plume in the near field and a segmented Gaussian plume in the far field. This ignores that winds are complex and variable near large water bodies, along rivers, and hilly terrain so that a much larger geographic area, in multiple directions, is impacted. EPA needs to incorporate these lessons in the final PAG.
- Non-Atmospheric Releases. Fukushima also showed that contamination is also spread by aqueous discharges. In Japan enormous quantities of contaminated water flowed into the Pacific Ocean as result of "feed and bleed" and from runoff into groundwater, streams and other water bodies from contaminants deposited by atmospheric releases on land.
- What Can't Be Cleaned-up? Lessons learned from Fukushima show that forests, water and shorelines, for example, cannot realistically be cleaned up and decontaminated. For example the Japan Times reported in September 2011[15] that

> In August, the government acknowledged difficulties in removing soil and ground cover from the forests, due mostly to the volume of radioactive waste that would be generated by the effort.

---

[13] NUREG/CR-6613 Code Manual for MACCS2: Volume 1, User's Guide, 2-2
[14] Gov't radiation info in English http://radioactivity.mext.go.jp/en/
[15] Institute probing radioactive contamination of Fukushima forests, Japan Times,, Sep. 17, 2011

ED_001057_00026684

"Huge volumes of soil and other (contaminated) items would be involved because the forests occupy a huge area."

The government effectively shelved any approach to decontaminating forests when it said that removing both the contaminated soil and compost materials would strip the forests of important ecological functions, including water retention.

Real world experience also shows that bodies of water, such as the Pacific, cannot be cleaned up either. Further, ocean currents may re-circulate the contamination for years contaminating and re-contaminating beaches and marine life increasing costs from a continuous need to cleanup and pay for damaged to the environment[16].

Waste Volume and Disposal

Lessons learned from Fukushima show that the Japanese Environment Ministry expects the cleanup to generate at least 100 million cubic meters (130 million cubic yards) of soil, enough to fill 80 domed baseball stadiums. [17]. The Yomiuri Press reported that disposal sites refuse to accept 140,000 tons of tainted waste. [18] Because there is no available storage for the high volume of waste and no community willing to host the disposal site,[19] waste is piling up and run-off from it contaminates and re-contaminates groundwater and property. [20] The problem cannot be solved soon because the technology is not there and cesium-137 takes 30 years to decay one half-life.[21]

The Japanese Government's clean-up budget for the next two years is $14 billion; the NRC's estimate is nowhere near that.

The Draft PAG passes disposal to the states and local communities; and it assumes that cleanup can be quickly accomplished. After Chernobyl, authorities quit trying to clean-up after 4 years.

---

[16] Fukushima's radioactive sea contamination lingers, Andy Coghlan, New Scientist, Sept 30, 2011; Radioactive cesium may be brought back by Ocean in 20-30 years , Tokyo Times, 09.16.11
[17] Ibid
[18] *Daily Yomiuri* - Disposal sites refuse to accept 140,000 tons of tainted waste March 4, 2012
[19] Mainiichi Press, *Residents near Fukushima mountains face nuclear recontamination every rainfall, October 11. 2011*
[20] Ibid
[21] Ibid

ED_001057_00026684

There is no excuse for ignoring waste storage, and Fukushima proved (and continues to prove) that latter is a pipe -dream. Even optimistically assuming an available radi oactive waste repository, it seems unlikely that there would be a sufficient quantity of transport containers, and many communities will quite certainly object to the millions of tons of hazardous materials being transported through them.

The EPA Draft si mply passes the buck. It acknowledges that "incidents that create large volumes of waste from a wide -scale radiological incident would likely overwhelm existing radioactive waste disposal capacity in the U.S." (Draft, pg., 69) Therefore it concludes that, "Following a nuclear incident, the states bear primary responsibility to identify and provide waste management options, including disposal capacity." (Ibid) The Draft incorrectly implies that there can be a solution. It says "safely managing and disposing of radioactive waste will require pre-planning at all levels of government and careful coordination with stakeholders at all stages of the decision-making process." (Ibid) It is time for EPA to pull "their big -boy pants up" and admit there is no solution.

Technologies for Cleanup Not Developed - Current Methods Ineffective

Cleanup methods used in Japan, and assumed in the Draft PAG, do not work. Hosing down buildings and plowing under fields does not remove contamination. It simply moves it to another place, such as the groundwater, to reappear at a later date and require more monies to either start again or bare the cost. For example, plowing will move the radiation to below the root zone for crops or reduce root uptake and food doses to the consumer of such crops. Thus, it cannot be said that the decontamination strategies identified remove the radiation from the environment. Also the fact that cesium is soluble, which means that precipitation events or fire-hosing can actually facilitate cesium binding to structural surfaces or spread it into a community's infrastructure (*e.g.*, sidewalks, gutters, drains, sewer pipes) and ecosystem (*e.g.*, groundwater, streams, lakes, reservoirs).[22] The ability of cesium and other fission products to bind to surfaces is especially pronounced for porous or rough surfaces.[23]

---

[22] Chanin, D.; Murfin, W. (1996). *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, DE9601166, Sandia National Laboratories. Original 300-dpi OSTI version available at: http://chaninconsulting.com/downloads/sand96-0957.pdf (10.4 MB), OCR-readable courtesy S. Aftergood, FAS, E-12.

[23] Ibid, 5-8, E-1, E-3, E-4, E-8, E-11

ED_001057_00026684

A reasonable question is why the EPA, FEMA, NRC and Japanese authorities assume hosing and plowing under fields is cleanup. The likely, and unacceptable, answer is that the needed technologies for clean up have not been developed - their development is predicted to be decades down the road - and the that cost of actually removing all of the contamination too big to even think about - far more than the $14 billion budgeted through 2014 by the Japanese government. However, the fact that the cost of any real clean -up is unimaginable is no excuse for the EPA to relax standards and allow folks to stay or move back to their communities.

The Faulty Premise of the Clean-Up Model[24]

Cleanup assumptions are based on WASH-1400; and WASH -1400, that in turn, were based on clean up after a nuclear explosion. Cleanup after a nuclear bomb explosion is not comparable to clean up after a nuclear reactor accident and assuming so will underestimate the task.

Particle Size : N uclear weapon explosions result in larger -sized radionuclide particles; reactor accidents release small sized particles. Decontamination is far less effective, or even possible, for small particle sizes. Nuclear reactor releases range in size from a fracti on of a micron to a couple of microns; whereas nuclear bomb explosions fallout is much larger - particles that are ten to hundreds of microns. These small nuclear reactor releases get wedged into small cracks and crevices of buildings making clean up extrem ely difficult or impossible. Further reactors release Cs-137 that are no only small particles but soluble. Cesium particles are capable of ion exchange with sodium and potassium in materials such as concrete and migrate over time into the interior and cannot be washed off. Plutonium on the other hand is insoluble.

Mass Loading: Nuclear weapon explosions result in fallout involving large mass loading where there is a small amount of radioactive material in a large mass of dirt and demolished material. Only the bottom layer is in contact with the soil and the massive amount of debris could be shoveled, swept up with brooms or vacuums resulting in a relatively effective, quick and cheap cleanup that would not be the case with a nuclear reactors fine particulate . The Japanese are learning this the hard way, as those in Chernobyl before had discovered.

[24] Chanin, D.; Murfin, W. (1996). *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, DE9601166, Sandia National Laboratories. Original 300-dpi OSTI version; NYS000241, December 21, 2011, Pre-filed written testimony of Dr. Francois J. Lemay, NYS Contention 12-C,

ED_001057_00026684

Type Radiation Released : In addition, a weapon explosion results in non -penetrating radiation so that workers only require basic respiration and skin protection. This allows for cleaning up soon after the event. In contrast a reactor release involves gamma radiation and there is no gear to protect workers from gamma radiation. Therefore cleanup cannot be expedited, unless workers health shamefully and unethically i s ignored. Decontamination is less effective with the passage of time.

Clean-up Standard

How clean is clean? The cleanup standard will be determined by what seems possible - how much it will cost and what the public will accept - not, as it should, by public health considerations.

> In the United States, a range of one in a population of ten thousand to one in a population of one million excess cancer incidence outcomes is generally considered protective for both chemical and radioactive carcinogenic cont aminant exposures. The range is the regulatory standard generally used in the context of EPA superfund response actions…A similar range risk may not be practically achievable for major incidents that result in the contamination of very large areas. In maki ng decisions about cleanup goals and strategies for a particular event, decision makers must balance the desired level of exposure reduction with the extent of the measures that would be necessary to achieve it, in order to maximize overall human welfare.
>
> While it may take many years to achieve final cleanup levels, a timely return to normalcy, including re -occupancy and viable community, will require a more flexible, iterative and inclusive. (Draft, pg., 53)

Likewise, firm standards were not pre -set in Ja pan prior to the accident. Real world experience there shows that the public will not tolerate a relaxed standard, unless misled b government agencies. The public expects cleanup to reach pre -accident levels.[25] The same will be true here.

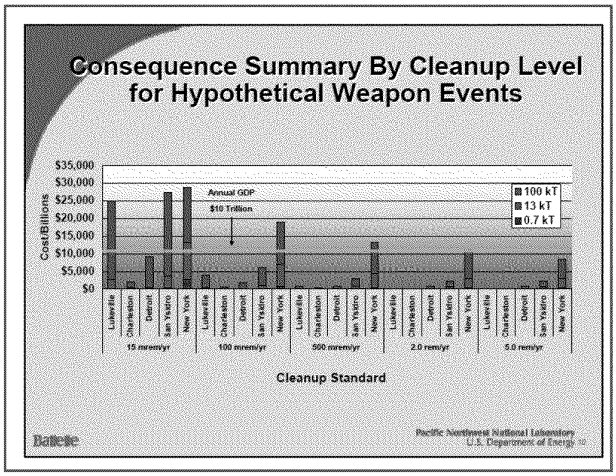
The economic cons equences of a radiological event are highly dependent on cleanup standards and cleanup costs generally increase dramatically for standards more stringent than 500 mrem/yr. This was shown true by two studies commissioned by the US Department of

[25] *In One Japanese City, Hot Spots to Avoid,* Wall Street Journal, Phred Dvorak, Sept 3, 2011

ED_001057_00026684

Homeland Security for the economic consequences of a Rad/Nuc attack. Although considerably more deposition would occur in reactor accident, magnifying consequences and costs, there are important lessons to be learned from these studies.

Barbara Reichmuth's study, Ec onomic Consequences of a Rad/Nuc attack: Cleanup Standards Significantly Affect Cost, 2005, [26] Table 1 Summary Unit Costs for D &D (Decontamination and Decommissioning) Building Replacement and Evacuation Costs provides estimates for different types of areas from farm or range land to high density urban areas. Reichmuth's study also points out that the economic consequences of a Rad/Nuc event are highly dependent on cleanup standards: "Cleanup costs generally increase dramatically for standards more stringent than 500 mrem/yr."



A similar study was done by Robert Luna, *Survey of Costs Arising from Potential Radionuclide Scattering Events,*[27] concluded that,

> …the expenditures needed to recover from a successful attack using an RDD type device …are likely to be significant from the standpoint of resources available to local or state governments Even a device that contaminates an area of a few hundred acres (a square kilometer) to a level that requires modest remediation is likely to

[26] Economic Consequences of a Rad/Nuc attack: Cleanup Standards Significa ntly Affect Cost Barbara Reichmuth, Steve Short, Tom Wood, Fred Rutz, Debbie Swartz, Pacific Northwest National laboratory, 2005

[27] Survey of Costs Arising From Potential Radionuclide Scattering Events, Robert Luna, Sandia National laboratories, WM2008 Conference, February 24-28, 2008, Phoenix AZ

ED_001057_00026684

produce costs ranging from $1 0M to $300M or more depending on the intensity of commercialization, population density, and details of land use in the area." (Luna, Pg., 6)

In essence, the PAGs and the documents associated with them are saying nuclear power accidents could be so widesp read and produce such immense radiation levels that the government would simply abandon most cleanup obligations and force people to live with exposures so high that extremely large fractions of the exposed population would get cancer from the exposure. He re, EPA's Draft PAG totally abdicates its responsibility to protect public health and the environment, not to mention morality.

C. Drinking Water Standard

The Drinking Water Standard is discussed above, Section II.

VII. LATE PHASE (CHAPTER 4)

There is overlap be tween the intermediate and late phase. In essence, the PAGs and the documents associated with them are saying nuclear power accidents , based on real -world experience in Japan, could be so widespread and produce such immense radiation levels that the government would simply abandon current exposure limits finding them not achievable and advise people to live with exposures so high that exposed population would get cancer from the exposure, especially the most vulnerable- fetus, children, women and the sickly.

The Draft PAG acknowledges that clean -up and decontamination is an enormously expensive job, extending over decades, and the volume and toxicity of wastes from a wide -scale radiological incident is likely to overwhelm existing waste capacity in the U.S. (pgs. 60, 61, 69). Therefore they pass responsibility for the impossible task of dealing with the waste to states; although, the federal government, not the states, have responsibility for assuring the safe operations of nuclear reactors and security. The federal agencies blew it and now the states get responsibility for the "orphaned" waste.

Further the EPA Draft PAG, like NRC, fails to acknowledge that the technology for real cleanup does not exist. As explained, hosing down buildings and plowing under f ields does not clean-up or decontaminate.

ED_001057_00026684

Last the section makes clear that the fundamental issues of clean up that: (1) neither the EPA, nor NRC , nor FEMA is responsible for clean-up; (2) that the cleanup standards that will determine what clean-up is required (and hence its cost) have not been defined; and (c) that no funding source has been identified. These three core points were identified in an Inside EPA investigative report in 2010- *Agencies Struggle to Craft Offsite Cleanup Plan for Nuclear Power Accidents*, by Douglas Guarino, Associate Editor. The report is available on line [28] or PW can make the report available, including emails obtained by Inside EPA by FOIA. The report says that:

> EPA, the Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) are struggling to determine which agency -- and with what money and legal authority -- would oversee cleanup in the event of a large-scale accident at a nuclear power plant that disperses radiation off the reactor site and into the surrounding area.

The FOIA documents indicate that the agencies began discussions in 2009 after NRC informed the other agencies that it does not plan to take the lead in overseeing such a cleanup; and significantly that money in the Price Anderson Act, an industry-funded insurance account for nuclear accidents, would likely not be available. See the documents obtained by *Inside EPA* (Part 1 and Part 2) under the Freedom of Information Act (FOIA, Part 1, July 27, 2010 Draft White Paper, developed by Jeff Blizzard (USEPA).

Until this is resolved – who is in charge, who pays, and what are the cleanup standards- the Final PAG should not be issued.

Who's In Charge – Who Is Responsible?

The Draft PAG Manual makes clear that no federal agency is in charge (section 4.1.6) - "federal departments and agencies may coordinate"(pg., 55); "Under the NRF and NDRF, FEMA may issue mission assignments to the involved federal agencies, as appropriate" (pg., 56) "NIMS was developed specifically for emergency management and may not be the most

[28] http://environmentalnewsstand.com/Environmental-NewsStand-General/Public-Content/agencies-struggle-to-craft-offsite-cleanup-plan-for-nuclear-power-accidents/menu-id-608.html

ED_001057_00026684

efficient response structure for long -term cleanup (pg., 57); "Issues that cannot be solved at the IC/UC or Unified Area Command level may be raised with the Joint Field Office (pg., 57); etc. "May" does not coordinate and take responsibility for getting the job done. Consequently without clear delegated authority, the job will drag on and not get done. The longer cleanup takes, probability is increased that resuspension will carry contaminants further afield and at the same time drive contaminants deep in the soil and groundwater.

History-Avoiding Federal Agency Responsibility

Disagreements over what government agency is in charge were documented in an investigative report by Inside EPA in 2010. It showed that:

EPA's Role: According to the Inside EPA investigative report, a July 27, 2010 white paper was never completed amid disagreements between EPA staff over what authority the agency may or may not have to clean up after a nuclear power plant accident. The paper cited Superfund as a possible source of cleanup funding – either through EPA's appropriation-driven Superfund trust fund or the agency's authority to sue parties responsible for contamination under Superfund law. But significantly EPA staff disagree on whether Superfund is applicable to clean up after a nuclear power plant accident, calling into question its viability as both a source of funding and cleanup authority.

Some at EPA contend that "special nuclear material from a nuclear incident" is exempt from the types of toxic releases governed by Superfund, according to the documents. Others suggest that such material is typically commingled with chemicals and other radioactive materials that are covered by the law, meaning EPA would be able to assert its Superfund authority to conduct a cleanup.

In internal e-mails, other EPA staff provides examples of instances where the agency has been involved with cleanups at nuclear power plant sites due to the sites being contaminated with chemicals. But Jean Schumann, a lawyer in EPA's Office of Emergency Management (OEM), criticized suggestions that the presence of chemical contaminants gives the agency the authority to clean up after a nuclear power plant incident. In one August 5 e-

ED_001057_00026684

mail, Schumann argues it is uncertain whether Superfund law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. "I think there is enough uncertainty still on what the 'release' exclusion means."

NRC's role: Some federal officials previously assumed NRC had authority and would be the lead agency. However, according to the FOIA documents attached, NRC said that it was not the lead agency and tried to "pass the ball" to EPA, suggesting EPA

would be the appropriate agency to lead such an effort. But, as said above, in an August 5, 2010 email, EPA's Ms. Schumann said that it was uncertain whether Superfund Law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. In the draft white paper

FEMA's Role: While NRC and FEMA require nuclear plants to have emergency response plans, it is not clear these plans extend beyond the initial aftermath of an accident or apply to radiation dispersed over large areas, the documents say. The government's emergency response authorities under the Stafford Act, for instance, expire 60 days after an incident, the draft document notes.

U.S. President: A Presidential declaration of an emergency "leads to rather limited financial assistance being made available through FEMA" and a "potentially more useful Presidential declaration of a major disaster" appears limited to "natural events," the document said.

States Responsibility: It is apparent that because, "waste resulting from a large scale incident would likely overwhelm current disposal capacity" (pg., 60), "[f]ollowing a nuclear accident, the states bear primary responsibility to identify and provide waste management options, including disposal capacity." (pg., 69)

Stakeholder Involvement: The section talks about opportunities for stakeholder involvement (pgs., 51, 52, 54-56) but it is our understanding that EPA is the only Federal Agency that requires stakeholder involvement. Therefore if EPA has a "say" in this regard,

ED_001057_00026684

cleanup will take longer; if, on the other hand, EPA remains not the responsible lead party, then meaningful involvement is not guaranteed.

Who Pays Or Where Is The Money Coming From?

Price Anderson: the industry-funded account established under the Price Anderson Act, which Congress passed in 1957 in an effort to limit the industry's liability, would likely not be available to pay for such a cleanup. The account likely could only be used to provide compensation for damages incurred as the result of an accident, such as hotel stays, lost wages and property replacement costs, the documents show, leaving federal officials unsure where the money to pay for a cleanup would come from.

Evidence – Emails Obtained by Inside EPA's FOIA Request

The following excerpt from Stuart Walker' email, EPA, says that "The insurance funds are not used to cover cleanup costs associated with the incident."

Evidence – Emails Obtained by Inside EPA's FOIA Request

The following excerpt from Stuart Walker' email, EPA, says that "The insurance funds are not used to cover cleanup costs associated with the incident."

From:	Stuart Walker/DC/USEPA/US
To:	Charles Openchowski/DC/USEPA/US@EPA
Date:	07/30/2010 06:54 PM
Subject:	Upcoming political level (AA, Administrator, maybe Obama/Biden) exercises emergency and late phase cleanup exercises on Nuclear Power Plant Incident

ED_001057_00026684

Dr. Steve Landry, SOE Support Team, reviewed the draft scenario. Dr. Landry explained that the intent of the scenario is to have significant damage that exceeds the cap of the $10 billion Price-Anderson Act (PAA). Additionally, the location chosen for the scenario event should be neither "worst case" nor "best case," but somewhere in the middle.

An NRC representative stated that the PAA actually has a $12 billion cap, but that it is not really the issue. The PAA is an insurance policy for displaced persons/damage in the event of a nuclear power plant incident. Once the $12 billion has been exceeded, the U.S. Treasury will cover costs for displaced people. However, the Insurance funds are not used to cover cleanup costs associated with the incident. The NRC representative also noted that each licensee is insured for over $300 million. Whether or not D/As could recover the costs allocated towards the cleanup is an open question and would be decided by the courts, but PAA is designed to support the people affected by the accident.

The following except from the July 27, 2010 Draft White paper says that, " NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after the nuclear power plant inci dent only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personal items, lost wages etc.

ED_001057_00026684

NRC-FEMA-EPA White Paper:
Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Incident

Background:

- The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Federal Emergency Management Agency (FEMA) began a series of quarterly meetings in 2009 to discuss unresolved concerns regarding off-site environmental cleanup following a nuclear power plant incident.

  Deleted: an

- NRC recently indicated to FEMA that they would not be taking the lead for off-site environmental cleanup after a nuclear power plant incident. NRC suggested EPA would be the appropriate agency to lead such efforts.

  Formatted: Bullets and Numbering

- NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident, only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personnel items, lost wages, etc).

  Deleted: the

- FEMA convened a workgroup to discuss the following issues related to nuclear power plant incidents: potential Agency roles (e.g., who would lead cleanup efforts); cleanup authorities; and fund sources.

- Evaluation of language from the *Price-Anderson Act*, the *Stafford Act*, and EPA's previous policies and expectation that the *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act) would generally not be used for response actions to address releases from NRC-licensed sites including nuclear power plants, may indicate a potential gap in authority to perform or oversee and fund off-site cleanup following a nuclear power plant incident, depending on the circumstances of the incident and the subsequent declarations of the federal government.

  Deleted: *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act), and

- The Report to Congress from the Presidential Commission on Catastrophic Nuclear Accidents (See Attachment D)[1]: outlines a number of concerns regarding nuclear power plant incidents. The report covers the sourcing of funds under a "Major Disaster," a "Catastrophe," and how to prepare and respond to a "catastrophic disaster."
  - Current plans do not cover "long-duration accidents that have impacts over large land areas".
  - The authority of the Court to award damages does not extend to executive branch powers.

Objective:

- Provide current understanding on potential authorities and sources of funding for off-site cleanup following a nuclear power plant incident.

The next except from the July 27, 2010 Draft White paper lays out the potential cleanup authority and funding source of the Price Anderson Act. It essentially repeats what Stuart Walker, EPA, email's said in the first example, "ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner."

ED_001057_00026684

Potential Cleanup Authority and/or Funding Source # 1: *Price-Anderson Act*

- Examples of Potential Circumstances Where It May Be Appropriate to Use the *Price-Anderson Act*: In addition to an accident, the nuclear power plant incident may be the result of: theft or sabotage; the transportation of nuclear fuel to a reactor site; or the storage of nuclear fuel at a reactor site.

- Possible Actions under the *Price-Anderson Act*:
  - Provide financial assistance to utilities operating nuclear power plants that have experienced an incident.
  - For individuals who have suffered damages:
    - Those who suffered bodily harm, sickness, or disease will receive financial assistance.
    - Evacuees receive property damage and loss expenses as well as living expenses.
  - Local and State governments can receive financial assistance to assist with evacuations, sheltering, and other immediate response activities.

- Funding Source for the *Price-Anderson Act*:[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act*:
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

Obtained by InsideEPA.com

Findings:

Potential Authorities and/or Funding Sources for Off-Site Cleanup Following a Nuclear Power Plant Incident

- *Price-Anderson Act:*
  - ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner.

Further, the following except from the July 27, 2010 Draft White paper from Kathryn Snead, EPA, explains again that there is a gap in authority to perform or oversee and fund offsite cleanup and that, at bullet 3, "NRC al so indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident only for compensation for

damages incurred (e.g., hotel stays, replacement costs for property and personal items, lost wages, etc.

Kathryn Snead To all, Please find attached a draft white paper o... 07/27/2010 03:51:39 PM

From: Kathryn Snead/DC/USEPA/US
To: Stuart Walker/DC/USEPA/US@EPA, Charles Openchowski/DC/USEPA/US@EPA, Jennifer Mosser/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA
Cc: Lee Veal/DC/USEPA/US@EPA, Jeffrey Blizzard/DC/USEPA/US@EPA
Date: 07/27/2010 03:51 PM
Subject: White Paper on Off-Site Cleanup Following a Nuclear Power Plant Incident

NRC-FEMA-EPA White Paper:
Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Incident

Background:

- The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Federal Emergency Management Agency (FEMA) began a series of quarterly meetings in 2009 to discuss unresolved concerns regarding off-site environmental cleanup following a nuclear power plant incident.

  Deleted: an

- NRC recently indicated to FEMA that they would not be taking the lead for off-site environmental cleanup after a nuclear power plant incident. NRC suggested EPA would be the appropriate agency to lead such efforts.

  Formatted: Bullets and Numbering

- NRC also indicated the Price Anderson Act would be unable to pay for environmental cleanup after a nuclear power plant incident, only for compensation for damages incurred (e.g., hotel stays, replacement costs for property and personnel items, lost wages, etc).

  Deleted: the

- FEMA convened a workgroup to discuss the following issues related to nuclear power plant incidents: potential Agency roles (e.g., who would lead cleanup efforts); cleanup authorities; and fund sources.
- Evaluation of language from the *Price-Anderson Act*, the *Stafford Act*, and EPA's previous policies and expectation that the *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act) would generally not be used for response actions to address releases from NRC-licensed sites including nuclear power plants, may indicate a potential gap in authority to perform or oversee and fund off-site cleanup following a nuclear power plant incident, depending on the circumstances of the incident and the subsequent declarations of the federal government.

  Deleted: *CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act), and

- The Report to Congress from the Presidential Commission on Catastrophic Nuclear Accidents (See Attachment D)[1]: outlines a number of concerns regarding nuclear power plant incidents. The report covers the sourcing of funds under a "Major Disaster," a "Catastrophe," and how to prepare and respond to a "catastrophic disaster."
  - Current plans do not cover "long-duration accidents that have impacts over large land areas".
  - The authority of the Court to award damages does not extend to executive branch powers.
- The following are questions and concerns are unresolved:

InsideEPA.com

DRAFT: DO NOT CITE OR QUOTE *July 27, 2010*

Potential Cleanup Authority and/or Funding Source # 1: *Price-Anderson Act*

- Examples of Potential Circumstances Where It May Be Appropriate to Use the *Price-Anderson Act*: In addition to an accident, the nuclear power plant incident may be the result of: theft or sabotage; the transportation of nuclear fuel to a reactor site; or the storage of nuclear fuel at a reactor site.

- Possible Actions under the *Price-Anderson Act:*
  - Provide financial assistance to utilities operating nuclear power plants that have experienced an incident.
  - For individuals who have suffered damages:
    - Those who suffered bodily harm, sickness, or disease will receive financial assistance.
    - Evacuees receive property damage and loss expenses as well as living expenses.
  - Local and State governments can receive financial assistance to assist with evacuations, sheltering, and other immediate response activities.

- Funding Source for the *Price-Anderson Act:*[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act:*
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

Obtained by InsideEPA.com

The following drafts from NRC-FEMA-EPA White paper: Potential Authorities and/or Funding Sources for Off-site Cleanup Following a Nuclear Power Plant Accident, July 27, 2010, Pg., 3 repeat the same language.

- Funding Source for the *Price-Anderson Act:*[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.

- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act:*
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.

At 6,

Findings:

Potential Authorities and/or Funding Sources for Off-Site Cleanup Following a Nuclear Power Plant Incident

- *Price-Anderson Act:*
  - ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner.

At 17

ED_001057_00026684

---- Forwarded by Elizabeth Southerland/DC/USEPA/US on 06/11/2010 12:13 PM ----

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

InsideEPA.com

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff anticipates this would be handled by some type of supplemental appropriation.

3. There is a FEMA expectation that EPA would be heavily involved in the environmental response work, possibly as the lead technical agency (think OSC, RPM role). EPA has not previously been major players in NRC exercises for NPP releases.

Charles and I believe we need a senior level management meeting (OSRTI, OEM, ORIA, OGC, and OHS) to discuss:

1. What would be proper role for EPA in these types of events, including the role of each of our primary offices and respective regional counterparts.
   -- There are of resource (FTEs and $'s) implications for EPA's level of involvement both during a real event and during exercises.
   -- There are also policy implications if EPA appears to be endorsing other cleanup approaches even in a remedial contractor role for NPP events, similar to concerns raised regarding the PAGs.

2. Given the current circumstances dealing with the Gulf spill (e.g., questions about who is in charge, is the federal government in control, etc) not inhibiting our flexibility under CERCLA is a key issue. Although possibly not the first choice to take a response action during a NPP incident, EPA should not agree to language that appears to a legal interpretation that inhibits this option.

---- Forwarded by Elizabeth Southerland/DC/USEPA/US on 06/11/2010 12:13 PM ----

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

InsideEPA.com

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff anticipates this would be handled by some type of supplemental appropriation.

3. There is a FEMA expectation that EPA would be heavily involved in the environmental response work, possibly as the lead technical agency (think OSC, RPM role). EPA has not previously been major players in NRC exercises for NPP releases.

Charles and I believe we need a senior level management meeting (OSRTI, OEM, ORIA, OGC, and OHS) to discuss:

1. What would be proper role for EPA in these types of events, including the role of each of our primary offices and respective regional counterparts.
   -- There are of resource (FTEs and $'s) implications for EPA's level of involvement both during a real event and during exercises.
   -- There are also policy implications if EPA appears to be endorsing other cleanup approaches even in a remedial contractor role for NPP events, similar to concerns raised regarding the PAGs.

2. Given the current circumstances dealing with the Gulf spill (e.g., questions about who is in charge, is the federal government in control, etc) not inhibiting our flexibility under CERCLA is a key issue. Although possibly not the first choice to take a response action during a NPP incident, EPA should not agree to language that appears to a legal interpretation that inhibits this option.

At 33,

From: Stuart Walker/DC/USEPA/US
To: Elizabeth Southerland/DC/USEPA/US@EPA, Davidw Charters/ERT/R2/USEPA/US@EPA, Helen Dawson/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA
Date: 06/11/2010 11:57 AM
Subject: Senior management meeting needed to discuss ongoing staff meetings with NRC and FEMA to resolve responsibilities for early, intermediate, and long-term response to nuclear power plant incidents

Hi Betsy,

See attached email from Colby Stanton that began EPA's involvement with NRC/FEMA efforts to clarify how response to a significant release (e.g., Three Mile Island, Chernobyl) from a commercial nuclear power plant (NPP) would be handled.

After 3 meetings with the other Agencies at the programmatic and general counsel staff, both Charles Openchowski and I believe that we need to have a senior level management meeting to discuss EPA's strategy for these efforts.

There are numerous issues that have arisen during these meetings since Colby's initial note, including:

1. Monies collected from nuclear industry to pay out in the event of a "nuclear incident" go to an insurance company for disbursement. It appears the monies may only go for compensating damages (e.g., cost of temporary or permanent relocation, pay for policemen, personal property replacement, etc) and not environmental cleanup.

2. There appears to not be pre-identified source of funding for environmental cleanup. NRC staff

anticipates this would be handled by some type of supplemental appropriation.

At 36,

From: Kathryn Snead/DC/USEPA/US
To: "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, "Blunt, Kenyetta" <kenyetta.blunt@dhs.gov>, Sara DeCair/DC/USEPA/US@EPA, "DeFelice, Anthony" <anthony.defelice@dhs.gov>, diane.donley@dhs.gov, "Greten, Timothy" <Timothy.Greten@dhs.gov>, grace.kim@nrc.gov, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Jennifer Mosser/DC/USEPA/US@EPA, Charles Openchowski/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA, anneliese.simmons@nrc.gov, Susan Stahle/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Jeffrey Blizzard/DC/USEPA/US@EPA
Cc: Lee Veal/DC/USEPA/US@EPA
Date: 05/25/2010 09:57 AM
Subject: EPA-NRC-FEMA Recovery Discussion on Nuclear Power Plant Incidents

To all,

I apologize about the short notice - my fault for taking so long to send this out:

Our next inter-agency discussion on Recovery from Nuclear Power Plant Incidents:
June 3, 2010 from 1 PM - 3 PM
Follows the FRPCC Meeting (with a break for lunch 11:30 AM - 1 PM)
Crystal City Courtyard Marriott
Blue Ridge Shenandoah Conference Room
2899 Jefferson Davis Highway
Arlington, VA 22202

A few action items that were identified during the last meeting:
- Anneliese Simmons, NRC, agreed to provide example text on the insurance exclusion language on cleanup.
- Anneliese Simmons, NRC, agreed to check on what was meant by "clearly identifiable accidents".

At 45

From: "Greten, Timothy" <Timothy.Greten@dhs.gov>
To: Stuart Walker/DC/USEPA/US@EPA, Kathryn Snead/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, <grace.kim@nrc.gov>, "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, Jean Schumann/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Sara DeCair/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, "Greten, Timothy" <Timothy.Greten@dhs.gov>
Date: 11/30/2009 07:16 PM
Subject: RE: Agenda: EPA-NRC-FEMA Recovery Discussion

Potential Issue - FEMA looking for someone (e.g., EPA, Corps) to run cleanup of public property after nuclear power plant accident

Stuart Walker to: Elizabeth Southerland, Helen Dawson 12/08/2009 02:17 PM
Cc: RobinM Anderson

Betsy, this is a follow-up email about what I mentioned to you in the hall. Last week I, OEM, ORIA, and OGC staff (including Charles) met with FEMA and NRC policy and general counsel staff.

We were meeting to discuss the role of NRC, EPA, and FEMA after a catastrophic release from a nuclear power plant, and how the compensation clauses of the Price Anderson Act might come into play because of the CERCLA definition of "release" (which makes a reference to Price-Anderson in excluding some releases from CERCLA jurisdiction). In Price-Anderson, Congress in essence set up a federally-backed insurance scheme to compensate victims of a nuclear reactor accident (e.g., Three Mile Island).

I had thought that EPA was there to explain why previous policy from the removal program was incorrect in stating EPA could not respond to such releases under CERCLA authority, but rather EPA had authority but generally expected NRC to have authority over such incidents and did not expect to be involved except for possible help requested by NRC and/or state.

I was surprised to find out that NRC did not intend to be involved in the cleanup or Price-Anderson compensation decisions for contamination that was outside the fenceline of the facility. NRC said that the authority for spending the $10 billion insurance dollars that could become available when the Price Anderson Act is triggered would be lie with an Insurance Company. After those funds were gone, they thought EPA might handle the site cleanup.

NRC does not currently know if the $10 billion can only be used for compensation for damages suffered by members of the public, or if it can be used for site cleanup. Also they have not asked the insurance company if they have any plans/guidance on how they will decide to distribute the monies, whether they have contractors lined up to do the cleanup work or would they expect each affected property owner to do the cleanup after getting a claim paid, or how they will answer the question of "how clean is clean" for purposes of either cleanup or determining what is considered contaminated for the purposes of compensation.

We will be meeting together again as a group. NRC intends on finding out answers to the groups question either prior to that meeting or possibly inviting the insurance company to the next meeting.

fyi, attached is the agenda for the meeting. Below is an email from FEMA the night before the meeting that lays out some of the issues.

ED_001057_00026684

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "supertund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

The above (12/08/09) paragraph 5 -6 says that, "NRC does not currently know if the $10 billion can only be used for compensation for damages suffered by member of the public, or if it can be used for site cleanup. Also they have not asked the insurance company…how they will answer the question of 'How clean is clean' for purposes of either cleanup or determining what is considered contaminated for the purposes of compensation." By the time they wrote the July 27, 2010 Draft, they were clear that ANI only would pay for damages not cleanup, as the preceding emails show.

At 45,

From: "Greten, Timothy" <Timothy.Greten@dhs.gov>
To: Stuart Walker/DC/USEPA/US@EPA, Kathryn Snead/DC/USEPA/US@EPA
Cc: Charles Openchowski/DC/USEPA/US@EPA, Colby Stanton/DC/USEPA/US@EPA, <grace.kim@nrc.gov>, "Benowitz, Howard" <Howard.Benowitz@nrc.gov>, Jean Schumann/DC/USEPA/US@EPA, Lee Tyner/DC/USEPA/US@EPA, "Milligan, Patricia" <Patricia.Milligan@nrc.gov>, Sara DeCair/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, "Greten, Timothy" <Timothy.Greten@dhs.gov>
Date: 11/30/2009 07:16 PM
Subject: RE: Agenda: EPA-NRC-FEMA Recovery Discussion

Good evening!

I hope everyone had a good Thanksgiving and made it through Monday.

After reading through the agenda and other notes, I ask that we move the discussion of the Stafford Act to after both Price Anderson and CERCLA have been discussed. Both of the other funding mechanisms should be discussed before we get to the Stafford Act, as both are the appropriate funding avenues before a Stafford Act declaration is made.

That said, I also have a suggestion about what our outcome might be, based on my discussing w/Diane Donnelly today. Please also excuse me if I'm missing key nuances or information here--I might be the newest player in this game.

I'm not sure how much cleaning up after a respectably-size nuclear power plant incident would cost. $50bil? The mechanisms set up by Price Anderson have set up a $10bil pool to pay for certain expenses. After that is exhausted, and for those expenses not covered, what vehicles are available? This is covered under Superfund language...yet my understanding is Superfund is essentially broke, as industry hasn't paid in since the mid 1990s. Likewise, Stafford Act funds are not available until a declaration is issued--and then only in line with what the declaration covers.

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "superfund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

Obtained by JeEPA.com

The one thing I'm reasonably sure about is the cost for a major long-term cleanup would be in excess of $10bil. If either Stafford Act or Superfund are tapped for $$, the bill is going to be so high that Congress will have to appropriate funds--there is no other way this bill will be paid. And getting those funds will be a political decision negotiated the heads of EPA, FEMA/DHS, NRC, Congress, and the White House.

The first deliverable this group should put together is a memo/paper that reads as a guide through this decision making process, explaining the steps and the different decision points. I think it should shy away from trying to toss the funding burden over the fence and say "superfund must do this!" or "Stafford act must do this", and stick to a neutral explanation of what the consequences of each funding action would be (i.e. "[blank] could be funded by CERCLA--the language allows it. However, CERCLA is incredibly underfunded for something like this). A political tool-kit, if you will, that lays out options and tradeoffs.

The second deliverable would be a memo simply explaining the how of administering a long-range cleanup...that is, no matter who pays for it, it will be a join effort. Each of the agencies has a key ability they bring to the table--EPA understands environmental cleanup/remediation, NRC understands the nuclear power industry, and FEMA has longstanding relationships with state/local government, law enforcement, etc. Both in distributing funding and administering a cleanup, all of these skills would be needed (one agency doesn't have the manpower, either in skill sets or sheer numbers, to pull it off). Also, all of the agencies would essentially be robbing peter to pay paul during a cleanup--they simply don't have standby resources for this beyond a thin bench.

See all of you tomorrow morning!

Tim

January 7, 2011

Re: Fw: Price Anderson info

Stuart Walker to: Jeff Maurer 08/11/2010 05:44 PM

Cc: Gilberto Irizarry, Kathy Jones, Lois Gartner, Randy Deitz

We haven't ever spelled this out anywhere. Nor has final cleanup levels been discussed by the FEMA, NRC, EPA workgroup looking at Price Anderson Act issues. So I don't have a clear answer, but here are some of my thoughts.

EPA has said that under CERCLA, and some other environmental laws (e.g., SDWA, CAA, AEA) that 25/100 mrem is not protective. So I don't think we would want to say we would promoting that as a cleanup level. Also, at one point during the DHS PAG (guidance for dirty bombs and nuclear weapons) development process NRC said they wanted a final cleanup level of 1 to 10 rem (that is 1,000 mrem to 10,000 mrem) and they wanted to apply those cleanup numbers to nuclear power plant meltdowns. I am not sure if NRC still feels the same way now.

In some of the AA level (OAR, OSWER, OW, OGC) which were followed up by Gina MCcarthy of OAR meeting with Lisa Jackson, it was decided we would NOT be using optimization in the ORIA PAG (Protective Action Guidelines) that would be proposed for final cleanup. We would instead be talking about using existing standards. Since this language still has too be drafted it is not certain if/how specifically CERCLA will be mentioned.

Obtained by OnSideEPA.com

Thank you for the opportunity to make comment. We sincerely hope our comment is instructive and that the final PAG will be changed to reflect our comments.

Respectfully,

Mary Lampert
Pilgrim Watch, director
148 Washington Street
Duxbury, MA 02332
Tel 781.934.0389
Email: mary.lampert@comcast.net

ED_001057_00026684

NRDC
THE EARTH'S BEST DEFENSE

July 15, 2013

Via Electronic Mail

U.S. Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20004

RE: Natural Resources Defense Council Comments on the EPA's DRAFT PAG Manual

Dear Sir/Madam:

The Natural Resources Defense Council (NRDC) offers the following comments regarding the Environmental Protection Agency's (EPA's) Draft "PAG Manual: Protection Action Guides and Planning Guidance for Radiological Releases," March 2013, Docket ID No. EPA-HQ-OAR-2007-0268. This manual is a proposed draft of an update of EPA's 1991 PAG Manual, 78 Fed. Reg. (15 April 2013) 22257-22260.

General Comments

The National Academies' BIER VII, Phase 2 Report gives "preferred estimates" of cancer risk per unit dose along with 95% subjective confidence intervals. The upper and lower bounds of these confidence intervals are typically a factor of two above and below the preferred estimates. In the event of a radiological accident, the bounds on the government's best estimates of effective doses to individuals—at 95% confidence—are likely to be significantly larger than a factor of two above and below the best estimates. Moreover, health risks can vary by as much as a factor of 20 depending upon the age and gender of the exposed individuals (and fetuses) and whether the government seeks to protect exposed individuals against the occurrence of cancer (morbidity) or only cancer fatality. Consequently, NRDC believes EPA can better serve the public by providing a more comprehensive discussion of risk, rather than focusing primarily on the specific dose ranges that should trigger protective actions. Further, where PAGs are offered EPA should establish separate PAGs for pregnant women, young children, average adults and senior citizens, or, in the alternative, set a single standard for all individuals at a level that protects the most vulnerable. In all cases the PAGs should be set on the basis of preventing cancer (cancer morbidity) and not just preventing fatalities.

NRDC endorses the analysis and recommendations of the group letter submitted by the Committee to Bridge the Gap, the Nuclear Information and Resource Service, NRDC and others, the conclusions of which are summarized here:

- Withdraw the 2013 EPA PAGs (Protective Action Guides)
- Do not weaken drinking water standards for radioactivity. Comply with existing Safe Drinking Water Act limits especially in the intermediate and late phases of disasters and cleanup. Provide real, concrete guidance to authorities on how to safeguard water supplies to protect the public to those levels or better.
- Eliminate any implication that EPA PAGs incorporate the worst provisions of Dept. of Homeland Security PAGS including "optimization" (a cost benefit analysis done by the polluter), use of "benchmarks" or ranges of radiation risk much higher than EPA historically allows.
- EPA should retain and strengthen, relocation PAGs for thyroid and skin doses and keep and strengthen (not weaken) the limit of 5 rem over 50 years.
- Replace the outdated FDA food contamination guidelines with markedly lower radioactivity in food.
- Do not permit nuclear waste to be disposed in regular garbage dumps, incinerators or hazardous waste sites, or sent to recyclers. Treat it like nuclear waste.
- Do not expand the PAGs, originally for big nuclear disasters, to apply to every radioactive release.
- We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

Chapter 2, Early Phase Protection Action Guides.

EPA did not update its Early Phase Protection Action Guides for sheltering-in-place or evacuation [1 to 5 rem (10 mSv to 50mSv) over 4 days], from those in EPA's 1991 PAG Manual, and did not update the cost-benefit analysis which was the basis for the 1991 recommendations. NRDC believes these Early Phase PAGs are too low by roughly an order of magnitude—roughly a factor of 10. Our reasoning follows.

First, the 1991 PAG Manual, Appendix C assessment is based on an assumed risk of $3x10^{-4}$ cancer deaths per person-rem. Since 1991, the National Academies BEIR Committee has revised its risk estimates. The BEIR VII, Phase 2 Report (2006) best estimates is $5.7x10^{-4}$ cancer fatalities per person-rem for a mixed population of all ages and both genders. The government's price deflator index has increased by about 50 percent since 1991. Therefore, updating these two quantities alone suggest the Early Phase PAGs should be reduced by a factor of 2.5 from the 1991 recommendations.

Second, while the BEIR VII, Phase 2 Report (2006) preferred estimate is 5.7×10^{-4} cancer fatalities per person-rem for a mixed population of all ages and both genders, the preferred estimate for morbidity is 26.2×10^{-4} cancers per person-rem for a population of 10 year old girls. Thus, the morbidity risk for 10 year old girls is approximately 4.6 times greater than the fatality risk for a population of all ages and both sexes, and for young female babies or fetuses the risk is estimated to be more than twice as great as that for 10 year old girls.

As noted above, EPA's Early Phase Protection Action Guides for sheltering-in-place or evacuation are 1 to 5 rem (10 mSv to 50mSv) over 4 days. Based upon the preferred estimate from BEIR VII, a 10 year old girl exposed to 0.5 rem [5 mSv] would have a 0.13 percent chance of an excess cancer—one excess cancer in a population of 765 exposed girls. BEIR VII's 95 percent confidence limits approximate a factor of two higher and lower than its preferred estimate. Surely, in a community containing 765 young girls, one would seek to shelter or evacuate these girls to avoid the expected cancer(s) (uncertainty range 0.5 to 2 cancers).

In the introduction to Chapter 2, EPA properly notes, "In all cases. All practical and reasonable means should be used to reduce or eliminate exposure." Nevertheless, this cautionary note will be lost on a reader focusing on the numerical PAGs given in Table 2-1. Both in the introduction and the tables EPA should remind government officials and the public that a basic tenet of the health physics profession is that all radiation exposures are potentially harmful and therefore any radiation exposure should be kept as low as reasonably achievable. In this regard, unlike evacuation, there is minimal risk associated with sheltering-in-place. Thus, in the event of a significant radiation release or the potential for an imminent release, sheltering-in-place may be advisable even when the projected doses are less than the PAGs.

Protective Action Guidance for Drinking Water

EPA did not propose a specific drinking water PAG. Rather, the agency seeks input on an approach and technical rationale for a drinking water PAG. (PAG Manual, p. 42) Given that bottled water is widely available commercially throughout the country, NRDC sees no necessity in relaxing the established enforceable drinking water standards for radionuclides under the Safe Drinking Water Act (SDWA), limiting exposures from drinking water to 4 mrem per year.

Protective Action Guidance for Food

EPA endorses the PAGs contained in the FDA's "Accidental Radioactive Contamination of Human Foods and Animal Feeds: Recommendations for State and Local Agencies" (FDA 1998), PAG Manual, p. 42. As noted in the April 15, 2013, press release of the Committee to Bridge the Gap and the Nuclear Information and Resource Service (*see* Attachment A), "Extremely high food contamination levels would be allowed by the incorporation of Food and Drug Administration 1998 guidance. EPA officials had previously criticized those standards, saying that 1 in 50 people eating food at those levels would get cancer from their exposure, on top of

our normal cancer risk." EPA apparently has forgotten that it is responsible for establishing Federal Guidance for radiation protection, and that it should not accede to the recommendations of other agencies that are contrary to the EPA's record on the matter.

Conclusion

For the above reasons NRDC believes EPA should withdraw the Draft 2013 EPA Protective Action Guides and start afresh, remembering that its responsibility is to protect the public.

Thank you for your consideration of these comments. Please do not hesitate to contact us at (202) 289-6868 if you have any questions.

Sincerely,

_____/s/_____
Geoffrey H. Fettus, Esq.
Senior Project Attorney, Nuclear Program
Natural Resources Defense Council
1152 15th Street NW, Suite 300
Washington, D.C. 20005
(202) 289-6868
gfettus@nrdc.org

_____/s/_____
Thomas B. Cochran, Ph.D.
Consulting Scientist, Nuclear Program
Natural Resources Defense Council
1152 15th Street NW, Suite 300
Washington, D.C. 20005
(202) 289-6868
tcochran@nrdc.org

Attachment A

EPA Dramatically Weakens Radiation Protection

For Immediate Release
Contacts: Dan Hirsch Committee to Bridge the Gap 831 336 8003
Diane D'Arrigo Nuclear Information and Resource Service 301 270 6477 x 15

April 15, 2013 The U.S. Environmental Protection Agency (EPA) is publishing in the Federal Register today controversial new Protective Action Guides (PAGs) for responding to radioactive releases. EPA says it solicits public comment but is nonetheless making the PAGs immediately effective.

The new PAGs eliminate requirements to evacuate people in the face of high projected thyroid, skin, or lifetime whole body doses; recommend dumping radioactive waste in municipal garbage dumps not designed for such waste; propose five options for drinking water, which would dramatically increase the permitted concentrations of radioactivity in drinking water, by as much as 27,000 times, compared to EPA's current Safe Drinking Water Act limits; and suggest markedly relaxing long-term cleanup standards.

"In essence the government is now saying nuclear power accidents could produce such widespread contamination and produce such high radiation levels that the government should abandon efforts to clean it up and instead force people to live with radiation-induced cancer risks orders of magnitude higher than ever considered acceptable," said Daniel Hirsch, president of Committee to Bridge the Gap.

The PAGs are intended to guide the response to nuclear power reactor accidents (like Fukushima in Japan, Chernobyl in Ukraine and Three Mile Island in the U.S.), "dirty bomb" explosions, radioactive releases from nuclear fuel and weapons facilities, and nuclear transportation accidents.

"EPA ignores the fact that women and kids are at even greater risk from radiation. The doses permitted by the 2013 EPA PAGs will allow indecent exposures to radiation," says Diane D'Arrigo of Nuclear Information and Resource Service. "Women are 50% more vulnerable than men and children are at even greater risk from radiation than adults, according to data from the National Academy of Sciences."

Extremely high food contamination levels would be allowed by the incorporation of Food and Drug Administration 1998 guidance. EPA officials had previously criticized those standards, saying that 1 in 50 people eating food at those levels would get cancer from their exposure, on top of our normal cancer risk.

The PAGs also incorporate and expand controversial Dept. of Homeland Security (DHS) PAGs adopted in 2008 which would allow long-term doses as high as thousands of millirems per year without cleanup being required. Associated guidance for carrying out the long-term cleanup, prepared for DHS and for which the comment period expires today, recommends abandoning EPA's long-held cleanup standards and instead allowing people to be exposed to doses as high as the equivalent of three chest X rays a day for one's entire life. Over 70 years, EPA estimates 1 in 6 people would get cancer from exposure that high, orders of magnitude higher risk than EPA has historically said is acceptable.

In addition, EPA admits that a nuclear power accident could far exceed the capacity of radioactive waste sites to manage waste generated from cleanups and therefore suggests allowing the waste to go to regular trash dumps, a fight the public has waged for decades in the US.

For more information: www.committeetobridgethegap.org and www.bit.ly/radstandards

Nuclear Energy Information Service

Illinois' Nuclear Power Watchdog since 1981

Office and Mail: 3411 W. Diversey Avenue, #16, Chicago, IL 60647-1245
(773)342-7650 www.neis.org neis@neis.org

August 1, 2013

The Honorable Gina McCarthy
Administrator and Acting Administrator
U.S. Environmental Protection Agency

Former Assistant Administrator for Air and Radiation

The Honorable Bob Perciasepe
Deputy Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Ave., N.W.
Washington, DC 20460

US EPA Air and Radiation Docket and Information Center
Mail Code: 6102T, 1200 Pennsylvania Ave NW, Washington, DC 20460
a-and-r-docket@epa.gov; Docket ID No. EPA-HQ-OAR-2007-0268;
www.regulations.gov; Fax (202) 566-1741

Re: Protective Action Guides for Radionuclides
(Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Administrator McCarthy and Deputy Administrator Perciasepe:

Thank you for the opportunity to comment on EPA's proposed alleged Protective Action Guidelines (PAG) for Radionuclides.

We apologize for submitting these comments late; however when we attempted to forward them electronically via the EPA website, we received this notice:

> Server not found
> Firefox can't find the server at erule-outage.erulemaking.net.

We ask that you take this tech-glitch into account, and accept these comments.

In short we are adamantly opposed to the PAGs as they have been presented. Previously, we signed on to comments which will be presented with other co-signers by the Nuclear Information and Resource Service (NIRS) of Takoma Park, Maryland, and for which as a convenience we present in summary below. We wish to make comments in addition to those provided in the NIRS sign-on letter.

NIRS LETTER SUMMARY POINTS:

Our primary concerns are:

(1) the proposal to allow, for one to several years after a release, radioactive contamination of drinking water at levels orders of magnitude above EPA's longstanding Safe Drinking Water Act (SDWA) limits,

(2) language contemplating long-term cleanup standards vastly less protective than EPA's historically acceptable risk range,
(3) the elimination of relocation PAGs for high thyroid and skin doses and for high projected cumulative whole body doses,
(4) the recommendation to permit radioactive waste to be disposed of in unlicensed disposal sites, including regular municipal garbage dumps,
(5) the inappropriate expansion of the PAGs to cover essentially all radioactive releases, from the most extraordinary (e.g. nuclear weapons explosions) to those far less consequential (e.g. transportation accidents involving relatively small amounts of radioactivity),
(6) relying on PAG dose limits as high or higher than those in effect decades ago despite the fact that official estimates of cancer risks from radiation have increased significantly over that period, and
(7) apparently un-reviewed retention of archaic and extremely high FDA food contamination guidelines.

ADDITIONAL NEIS COMMENTS:

1.) Radiation standards and the BEIR VII Report: To our knowledge no official refutation of the findings of the 2005 National Academy of Sciences BEIR VII Report, ***Health Risks From Exposure to Low Levels of Ionizing Radiation: BEIR VII – Phase 2***, have been adopted as the basis for the understanding of the effects of ionizing radiation. That Report validates the linear no-threshold standard for radiation exposure. For the EPA to promulgate PAGs which in essence allow for greater radiation exposure under disaster scenarios would mean that the federal government sanctions some kind of "permissible" level of additional deaths in contradiction to established scientific principles and norms. This is neither respectable science or policy, nor morally and ethically tolerable behavior for civilized nations.

2.) The "new normal" for radiation exposures: The historical record is constantly demonstrating that the amount of human contributed and artificially reconcentrated radiation is increasing in the environment. The development, testing and use of nuclear and uranium weapons, including depleted uranium (DU); the massive introduction of medical treatments and diagnostics; the consequent increase in the stockpiles of radioactive wastes; the attempts to expand the use of nuclear power worldwide; the inevitable probabilistic increase in intentional (a.k.a, "permissible") and accidental releases of radionuclides and disasters, such as Windscale, Chelyabinsk, Santa Suzanna, the Rio Puerco River, Three Mile Island, Chornobyl, Tokaimura, and Fukushima; and more recently the introduction of additional radium and radon contamination from the nascent fracking industry – all lead to the conclusion that, not only is the radiation inventory and hence public exposure to radiation increasing, but that somehow this is supposed to be an "accepted" consequence, a "new fact of Life."

We write to inform you – **this is NOT acceptable**. Weakening radiation standards and guidelines at a time when exposures from radiation from all sources are demonstrably on the increase is unacceptable, bad public policy, and morally and ethically reprehensible It seems to have become the unfortunate norm and habit of governmental regulatory bodies to adopt the bad habit that private industry has long institutionalized – avoid taking responsibility for harm done at all cost, unless the public bears that cost.

These PAGs lead to the conclusion that the U.S. government's position for radiation disasters is simply to move the goalposts, not hold accountable the environmental criminals responsible for the disasters. We remind you that the "P" in EPA is supposed to stand for "protection." The only thing offered "protection" by these PAGs is corporate financial interests, not public or environmental health.

We will not accept as valid standards – or even guidelines -- which condone or do additional harm to the public and the environment. These PAGs do both.

ED_001057_00026684

3.) Behavior of EPA representatives: In the course of disseminating its positions on the PAGs, an article that appeared in the Global Security Newswire [1] reports the following presentation by an EPA official:

> Speaking at a March 12 symposium hosted by the Defense Strategies Institute, **Paul Kudarauskas**, of the EPA Consequence Management Advisory Team, said events like Fukushima would cause a "fundamental shift" to cleanup.
>
> U.S. residents are used to having "cleanup to perfection," but will have to abandon their "not in my backyard" mentality in such cases, Kudarauskas said. ***"People are going to have to put their big boy pants on and suck it up."*** *(emphasis ours)*

While it's possible we misunderstand the thrust of Mr. Kunderauskas' comments, the notion that people are just going to have to get used to increased radiation contamination caused by irresponsible industries and wimp-assed regulatory accomplices is simply not one that we're going to be "sucking up" and getting used to any time soon. Please take that advisory to the bank.

That a public official – from ANY agency, let alone one supposedly dedicated to "protection" of the public -- would make such a patronizing, condescending and insulting statement in defense of "guidelines" dedicated to increasing public harm demonstrates

- that the Agency has abandoned its primary mission; and
- that the official making such remarks does not how to deal with the public, nor act in public

As a result, we request:

1.) that the EPA abandon these Guidelines

2.) that Mr. Kunderauskas be public censured, so co-workers understand what kinds of behavior are unacceptable; and

3.) that Mr. Kunderauskas be dismissed.

Thank you for the opportunity to present our additional views.

Gratefully,

David A. Kraft, Director

[1] "White House Supports Rollback of Cleanup Standards for Nuclear Incidents," Global Security Newswire, March 25, 2013.
http://www.nti.org/gsn/article/white-house-backs-rollback-cleanup-standards-nuclear-incidents/

ED_001057_00026684

David Kraft <neis@neis.org>
08/02/2013 06:34 PM

To Group A-AND-R-DOCKET@EPA
cc
bcc
Subject comments

Greetings --
We wish to submit the attached comments for the following docket:

Re: Protective Action Guides for Radionuclides

(Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Administrator McCarthy and Deputy Administrator Perciasepe:

Thank you for the opportunity to comment on EPA's proposed alleged Protective Action Guidelines (PAG) for Radionuclides.

We apologize for submitting these comments late; however when we attempted to forward them electronically via the EPA website, we received this notice:

Server not found

Firefox can't find the server at erule-outage.erulemaking.net.

We ask that you take this tech-glitch into account, and accept these comments.

Thank in advance.

--Dave Kraft--

--
David A. Kraft, Director
NEIS
3411 W. Diversey #16

Chicago, IL 60647
(773)342-7650
neis@neis.org
www.neis.org
SKYPE address: davekhamburg

No more Chornobyls! No more Fukushimas!
Invest in a nuclear-free world -- today!

NEIS PAG comments 8-2-13.docx

MessageID: <492ABC5CE9C3414CBD9EF5E87C862F64155BCE9A@NIRSSRV2.NIRS.local>
From: Diane D'Arrigo <dianed@nirs.org>
Sent: 08/04/2013 05:05:58 PM
Subject: RE: comments

Body: The deadline is extended until sept 16 so they are not late …

I am late on alerting folks to the extension!

dd

From: David Kraft [mailto:neis@neis.org]
Sent: Friday, August 02, 2013 6:35 PM
To: a-and-r-docket@epa.gov
Subject: comments

Greetings --

We wish to submit the attached comments for the following docket:

Re: Protective Action Guides for Radionuclides

(Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Administrator McCarthy and Deputy Administrator Perciasepe:

Thank you for the opportunity to comment on EPA's proposed alleged Protective Action Guidelines (PAG) for Radionuclides.

We apologize for submitting these comments late; however when we attempted to forward them electronically via the EPA website, we received this notice:

Server not found

Firefox can't find the server at erule-outage.erulemaking.net.

We ask that you take this tech-glitch into account, and accept these comments.

Thank in advance.

--Dave Kraft--

--

David A. Kraft, Director

NEIS

3411 W. Diversey #16

Chicago, IL 60647

(773)342-7650

neis@neis.org

www.neis.org

SKYPE address: davekhamburg

No more Chornobyls! No more Fukushimas!

Invest in a nuclear-free world -- today!

0178

Comment: Two comments on the EPA PAGs:

There is now much information coming from the Japanese and the World Health Organization (WHO) on the impact of the "relocation" of thousands of people who lived in the vicinity of the Fukushima Daiichi NPP after the plant was damaged by the Great Eastern Japan Earthquake and Tsunami. This incident has shown how large the loss of life is when such relocation occurs. Relocation was done due to concern about potential radiation exposure, however many organizations have reported that the actual potential for long-term effects was low. The effects of evacuation, however, were real and immediate. This new example and learning should be used to inform decisions and guidance about when to evacuate and relocate people. In addition, the National Council on Radiation Protection and Measurements (NCRP) is about to issue a report that directly addresses a number of issues associated with the EPA Protective Actions Guides (PAGs). The report to be published within a few months, entitled, "Decision Making for Late-Phase Recovery from Nuclear or Radiological Incidents" will provide a wealth of scientifically-based information that should be useful to the process of finalizing the revised PAGs.

Secondly, this document describes the 5 rem (occupational limit), the 10 rem (suggested dose to save valuable property) and the 25 rem (suggested dose to perform life-saving operations). It does not discuss the possibility that even higher doses could be received by emergency responders performing what NCRP Report No. 165, "Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers" calls "Time-Sensitive Mission-Critical" activities that could result in radiation doses higher than 25 rem. NCRP Report No. 165 expands the discussion on a Decision Dose of 50 rad. The concept of Decision Dose was addressed first in NCRP Commentary No. 19. It describes its use, by the Incident Commander, as a tool to address the need to and the consequences of exposing emergency responders to higher doses to accomplish those Mission Critical situations. This is especially important in an Improvised Nuclear Device (IND) incident. These potential higher exposures to emergency responders need to be addressed upfront in the PAGs so both the people writing radiological/nuclear emergency response plans and the incident commanders who use the plans are aware of the recommendations made by NCRP and others.

Debra McBaugh Scroggs

It is high time the Linear Non-Threshold hypothesis was abandoned. It cannot, by its very nature, be proven, since increased cancer risks of small effect can't be distinguished from general cancer statistics. On the other hand, there is abundant evidence that small amounts of radiation are either harmless or even beneficial. This is not only statistically sound but blatantly obvious, since many areas of the earth have orders of magnitude more naturally-occurring background radiation than others. If LNT were valid, we would see obvious elevated risks of cancer at those locations, but in fact we see nothing of the sort. We would also expect to see greatly elevated cancer rates among flight crews, who receive far more radiation than normal on a very regular basis. This, too, is not in evidence.

The embrace of LNT by regulators has served to cripple the nuclear power industry with onerous and costly regulations that have no basis in actual risk assessment. Policy makers must resist the tendency to surrender to public opinion on the matter, since this is a question of science, not public sentiment, the latter being woefully ignorant of the facts and bamboozled by decades of fear-mongering. This very exercise of soliciting public comment—and the thousands of comments already received—bodes ill for a science-based result. Will these comments simply be sorted according to sentiment with the most popular view winning the day? That would be a travesty of governance.

These regulations have serious ramifications for the nuclear industry, and using sound science to ease restrictive regulations that have been based on irrationality is the proper course of action. Climate change is perhaps the most serious challenge mankind has faced in human history, and without abundant nuclear power we stand no chance of meeting that challenge.

Many believe that all the energy humanity demands can be supplied with so-called renewables, primarily wind and solar. The assertions most often cited for this fantastical view are from papers by Jacobson & Delucci, of Stanford and U.C. Davis, respectively. Yet their study is flawed in ways that are almost ludicrous to contemplate. For one thing, they posit that humanity will use far less energy in the future, ignoring the fact that we will likely have ten billion people on the planet by mid-century. Even the basic requirement of providing fresh water for so many people will require vast amounts of energy, since most of it will have to come from desalination (and be moved to where it's needed). They also seem oblivious to the fact that billions live in relative energy poverty today, and even more billions will be striving to raise their standard of living to western standards.

Germany is often pointed to as a model for all-renewables advocates, with about as much factual evidence as the LNT hypothesis. But for the moment let's ignore the fiasco that is German energy policy and just look at their energy use. The country is perhaps the most advanced when it comes to embracing energy efficiency measures, and at the same time they have retained a lot of their industry instead of offshoring it like many other countries. They use slightly more than half the energy per capita per annum compared to the USA. So let us imagine a not too distant future where ten billion people consume as much energy as today's average German. We'll call that the high-energy planet scenario. How much land would that require?

If we use J&D's own data, the land area needed for wind turbines and solar panels would be equal to the entirety of South America! That also happens to be the amount of land currently planted with crops globally, both annuals and tree crops (but excluding all grazing land). Now consider that entire vast continent covered with wind turbines and solar panels (woe to all bird and bat life) when compared to a world that derives all its energy from nuclear power. Let's use the land footprint of the Westinghouse AP1000 reactor for comparison, a new passively-safe design that's being built today in both China and the USA. If we were to provide all the energy humanity needs for ten billion people on a high-energy planet, all the AP1000 power plants necessary to provide that energy could fit within the metro area of Buenos Aires, Argentina with room to spare!

I relate these simple facts to illustrate the absolute need to encourage the deployment of nuclear power to address the climate change challenge. Enacting regulations based on sound science rather than fear and ignorance is an important step. Please consider the scientific realities, not the number of fearful people who have bothered to add their comments. If we make energy policy a popularity contest, we will all be the losers.

Tom Blees
President, The Science Council for Global Initiatives

0188

The new Protective Action Guides are a positive step in the right direction toward improved public protection in the event of a radiation related event. It is good to provide public officials and first responders with clear guidance that will help them to calm the fears of a public that has been taught to be afraid of that which they cannot see, smell or touch.

They do not go far enough, however, in that they still rely on overly conservative exposure limits. They still result in the potential for initiating unnecessary and hazardous movement of large numbers of people to avoid trivially small exposures.

Lengthy and detailed studies have been undertaken on large samples of humans that have been accidentally or purposely exposed to ionizing radiation from both external sources and ingested radioactive material. Those studies all point to the conclusion that there is no measurable increase in harm or cancer risk for any exposure that is less than about 100 mSv.

Damage from low doses does not appear to accumulate due to adaptive response and other biological repair mechanisms. As a result, a growing number of radiation health specialists and researchers like Wade Allison, Myron Polycove, Jerry Cuttler, and Ludwig E. Feinendegen have determined that humans can withstand repeated or chronic exposures as long as they are given at a rate less than about 100 mSv per month. That is slow enough to allow the repairs to work well.

When bad things happen, one of the most important things that public officials and first responders can do is to provide calm direction that helps people to avoid real hazards. After the event happens, it is important to apply all of the knowledge that we have accumulated in order to restore areas back to their pre-event productivity and economic activity. Disrupted lives or lives spent trembling in fear can lead to numerous negative health effects that are far more real and measurable than the imaginary negative health effect of low dose radiation.

Rod Adams
Publisher, Atomic Insights
Host and producer, the Atomic Show podcast

Nuclear Information & Resource Service
6930 Carroll Avenue Suite 340 Takoma Park, MD 20912
301-270-6477 nirsnet@nirs.org www.nirs.org

NIRS Southeast Office
PO Box 7586 Asheville, NC 28802
828-252-8409 maryo@nirs.org www.nirs.org

The Honorable Gina McCarthy, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building, 1200 Pennsylvania Ave., N.W.
Washington, DC 20460
McCarthy.gina@Epa.gov

US EPA Air and Radiation Docket and Information Center
Mail Code: 6102T, 1200 Pennsylvania Ave NW, Washington, DC 20460
a-and-r-docket@epa.gov; www.regulations.gov

September 16, 2013

Re: Protective Action Guides for Radionuclides
(Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Administrator McCarthy:

On September 11 and 12, *National Journal* issued two investigative news articles[i] raising troubling questions about the conduct of EPA personnel in appearing to work at cross purposes to EPA radiation protection policies. EPA documents released by the *Journal* indicate some EPA staff have been making presentations on behalf of the agency that appear to suggest it is EPA policy that there may be levels of radiation that are not harmful and may in fact be good for you ("hormesis"), that EPA policy allows disposal of "low-level" radioactive waste in other than licensed radioactive waste facilities or by release into the commercial recycling stream; and that the agency's CERCLA standards should be ignored.

The articles also raise questions whether the new Protective Action Guides (PAGs) for responding to radiological releases and issued for public comment involve a kind of "bait and switch." The public was asked to comment on PAGs that do not contain the controversial provisions of "optimization" and reliance on exceedingly lax "benchmarks" for long-term cleanup initially put forward by the Bush Administration but withdrawn by the Obama Administration. However, EPA staff, in documents obtained by the *Journal*, says they are acting as though those provisions were still in effect.

I enclose the articles, ask that they be part of the record on the PAGs, and request that you take action to assure that your personnel carry out the agency's policies on radiation protection rather than work to undermine them.

Sincerely,

Diane D'Arrigo
Nuclear Information & Resource Service
301 270 6477 x 15, dianed@nirs.org

---

[i] http://www.nationaljournal.com/global-security-newswire/epa-documents-raise-doubts-over-intent-of-new-nuclear-response-guide-20130911?mrefid=mostViewed; http://www.nationaljournal.com/global-security-newswire/does-u-s-advice-on-disposing-fukushima-waste-apply-back-home-20130912

Comments on Revision to PAG Manual

Comment No.	Page	Section	Subject	Paragraph or Location	Comment
Requested Comments on Specific Issues					
1		Entire Manual	Use of FRMAC Methods		Agree that using the FRMAC Methods is most appropriate and will allow easy update of dose parameters as new information is discovered. It is NOT appropriate to include tables from the FRMAC Assessment Manual as that will have the negative effect of "codifying" whatever tables are inserted and making it much more difficult to ensure the most up-to-date methods are employed. It is, however, important that knowledgeable dose assessment personnel use the information with an understanding of the assumptions made by FRMAC so that modifications for specific incidences can be intelligently made.
2		Entire Manual	Short-term emergency drinking water guide		A short-term, emergency drinking water guide is appropriate and should be developed.
3		Entire Manual	1998 Food Guidance		Although comments are not requested, how have changes in internal dosimetry affected the calculations? Also, the PAG Manual should write the reference to the food guidance so that future changes can easily be incorporated without having to again change the PAG Manual.
4		Chapter 2	Use of KI for the public		Agree that this is appropriate for ease of implementation for PUBLIC actions. More emphasis is needed to ensure that KI use is not used in place of evacuation. See comment 18 for additional concerns.
5		Chapter 2	Removal of skin and thyroid evacuation thresholds		It is NOT appropriate to remove the skin and ORGAN evacuation thresholds. For some accident types (especially those with a single radionuclide that may pose an internal hazard), the organ dose may be more limiting than the whole body effective dose.
6		Chapter 3	Removal of 5 rem over 50 year relocation PAG		It is appropriate to specifically exclude the 50 year relocation PAG (especially in light of the lessons learned during the Fukushima response).
7		Chapter 3	Guidance on reentry		Helpful.
8		Chapter 3	Develop combined Intermediate Phase PAG (for all pathways)		It is NOT appropriate to combine the food pathway with the groundshine and inhalation (of resuspended material) pathways since the protective actions are so different. The food pathway PAGs are designed to stop ingestion of a contaminated food no matter where the consumer may be. However, as noted in section 3.4.2 (page 41, last paragraph of section), relocation may

ED_001057_00026684

Comment No.	Page	Section	Subject	Paragraph or Location	Comment
					be necessary based on ingestion dose if another food source cannot be assured.
9		Chapter 4	Usefulness of cleanup guidance		Helpful.
10		Chapter 4	Merging of 2008 RDD-IND planning guidance		Appropriate.
11		Chapter 4	Radioactive waste disposal planning guidance		Helpful.
General Comments					
12			PAG Development		The PAGs have not numerically changed from the 92 Manual; however, better knowledge (from Fukushima response) of the risks associated with evacuations and relocations may require a re-evaluation of the risk/benefit of these actions at the stated PAG levels. The PAGs may need to be increased.
13	Multiple		Use of FRMAC Methods		Update all references to December 2013 FRMAC Assessment Manual.
14	1	1.1	Protective actions	List of protective action examples	Include relocation; especially since in also goes along with the water and food info.
15	4	1.3.4	Key changes	Last ¶, last sentence	"All other PAGs and corresponding protective actions from the 1992 PAG Manual remain unchanged." - Not true. Have removed the thyroid and skin PAGs (specific organs).
16	5	1.3.4		First ¶, next to last sentence	Left off the "." to end the sentence.
17	7	1.4.1	EPZ sizes	¶ under table 1-1	May want to make this less prescriptive of the 10-mile and 50- mile EPZ since these are under review for Small Modular Reactors (SMRs); also, the distances are approximate and should include considerations for political and geographical boundaries.
18	7	1.4.1	Clarification needed	Table 1-1	• Drinking water PAG will need to be inserted in this table. • Footnote for food PAG should allow possible future changes. • Footnote for KI use should allow possible future changes. • For the KI PAG – need to be clear that the FDA guidance is different for different age groups and "circumstances" but that for simplicity EPA has adopted the 5 rem projected child thyroid dose. Does not and should not be applied to a nursing home that cannot evacuate and has no children in it. (I.e., this is too prescriptive.)
19	13	2.2	Exposure	Bulleted list	• Add "As noted above, deposited

ED_001057_00026684

Comment No.	Page	Section	Subject	Paragraph or Location	Comment
			pathways; clarification needed		material may also be resuspended into the breathing zone and contribute to the inhalation dose" to the deposition bullet. • This whole section will be confusing when looking at the FRMAC assessment method since they talk about 4-pathways and it looks, at first glance, like only three here. For clarity, have two sub-bullets under "inhalation" separating out the plume and resuspension pathways. • Deposition bullet, 2nd sentence, remove "to skin and internal body organs" – confusing.
20	13	2.2	Exposure pathways; clarification needed	Last ¶, 2nd sentence	The use of the word "groundshine" here seems to mix the internal and external components of exposure. Clarify.
21	14	2.2	Exposure pathways; clarification needed	First ¶, last sentence	• Add "(approximate 1 meter; waist-level)." • Add "but may be included for completeness." Especially important since FRMAC makes such a big deal of including the resuspension inhalation dose. • May also consider adding at the end of the paragraph "For example, the dose from inhalation of resuspended materials is much less than 10% for intakes during the early phase; however, it may be included in the methods used to calculate the total dose for that period."
22	15	2.2.1	Clarification needed	First ¶, first line	Confusing to lay person; consider adding "until the center of the plume is at ground level" after "from the source".
23	15	Table 2-1	PAGs	Sheltering-in-place/ evacuation PAG	Should include organ dose PAG (5 rem); it may be limiting in some cases. (See comment 5.)
24	15	Table 2-1	KI use	KI use	Need to include (in footnote) that this level was chosen for simplicity of implementation and that for special populations (such as a nursing home), other values may be more appropriate.
25	15	Table 2-1	Clarification needed	Footnote b	Include "plume submersion" with the groundshine because this implies no direct plume exposure.
26	15	Table 2-1		Footnote d	Refers to incorrect section, should be section 2.3.4.
27	16	2.3.1	Sheltering-in-place vs. shelter or sheltering	Entire section	Need to be careful to use "sheltering-in-place" and not "shelter" or "sheltering" – there are some very distinct definitions that need to be adhered to throughout this section. Define "shelter" – it is used here to mean mass care centers or something of that nature. This section needs to be crystal clear on the difference between "sheltering-

ED_001057_00026684

Comment No.	Page	Section	Subject	Paragraph or Location	Comment
					in-place" and "shelter." In fact, it would be best to use some other term instead of shelter; but, too many other agencies are using "shelter."
28	16	2.3.1	Clarification needed	First ¶, next-to-last sentence	Sentence needs a little more explanation – such as "because the air inside a vehicle rapidly equalizes with the outside air even when all of the windows and vents are closed."
29	16	2.3.1	Clarification needed	First ¶, last sentence	"Seldom" or never?
30	16	2.3.1	Clarification needed	Second ¶, last sentence	This is the first place where the IND guidance is referenced. Seems to need a bit more explanation. Actually seems out of place here the way it is.
31	17	2.3.2	Clarification needed	Sheltering-in-place list	"e.g." stuff should all be in parentheses.
32	17	2.3.2	Organ dose PAG	Last major bullet (about radioiodine or particulates)	If this is true (inhalation dose may be a controlling criterion for protective actions), why has the Committed Equivalent Dose (to an organ) PAG been eliminated?
33	19	Figure 2-1	Clarification needed		Confusing – is this dose reduction from DEPOSITED material or material that is still in the air?
34	20	2.3.4	Clarification needed	5th ¶	Define "neonates."
35	20	2.3.5	EPZ sizes	1st ¶	Default EPZ size are approximate – this is written as absolutes. Also, sizes may be different for SMRs (like they were for Big Rock Point).
36	21	2.3.5		1st ¶ on page	Footnote "10" seems to be in the wrong place – applies more to the 2nd paragraph since is addresses "other type of nuclear facility."
37	21	2.3.5		2nd ¶ on page, last sentence	Remove "," after EPZs (it doesn't belong).
38	22	2.4	Clarification needed	Entire ¶	• External exposure to the plume AND ground deposition (left out the deposition). • FRMAC does NOT have a method, at this time, of determining thyroid dose using their manual! • Whole paragraph needs to be rewritten to clarify it. • Question for FRMAC – uses the most restrictive lung clearance for Cs; why don't they use vapor for I?
39	23			Footnote 13	Incorrect reference to footnote 7 – should be footnote 10.
40	24	2.4.3	Clarification needed	2nd ¶	FRMAC includes many Dose Conversion Factors and then LOTS of other dose parameters – this will be really confusing for someone looking in their manuals. There are just so many things used in FRMAC – somehow need to get this across. May help to list some of the variables that have to be considered in the 1st paragraph (such as particle size, deposition velocity,

ED_001057_00026684

Comment No.	Page	Section	Subject	Paragraph or Location	Comment
					resuspension factor, weathering factor, etc.).
41	24	2.5	Clarification needed	Entire section	Emphasize that lowest dose limit should always be used – higher levels require planning and KNOWLEDGE. When doing intermediate phase work (such as taking environmental samples), the dose limit is the OCCUPATIONAL limit – NOT these emergency limits.
42	24 and 25	2.5 and 2.6	Clarification needed	Entire sections	Using "emergency worker" and "response worker" and "emergency responders" interchangeably yet there is a difference in how these people should be used and their doses controlled. Should probably define exactly what is meant – this is an area that was muddled in the 92 PAG Manual. It should be clarified. Should also include worker dose control in Chapter 3 (Intermediate phase) to ensure that occupational levels are used.
43	25	2.5		2nd ¶ (1st full ¶)	Update references for FRMAC Health and Safety Manual (2012 version).
44	30 – 32	2.7 and 2.8	Contamination control	Entire sections	Lazy version of contamination control. Should be risk based. Use guidance from FEMA-REP-21/22 and other more recent documents to determine guidance. CDC is lacking specific guidance. Specific guidance is needed to ensure scientific concerns are appropriately addressed. By continuing to use the 2 x background action level (which was only used as a place holder until risk based levels could be determined), the "irrational fear of radiation" endures. May need to perform additional calculations and experiments for the other radionuclides in the FRMAC list to ensure that the levels specified in FEMA-REP-21/22 are acceptable for other radionuclides. Also need to consider alpha contamination.
45	35	3.3	Clarification needed	5th ¶	Change first sentence to: In most scenarios, relocation decisions will be based on doses from external exposure to the whole-body from deposited materials and internal exposure from inhalation of resuspended contamination.
46	36	Table 3-1	PAG for simple dose reduction techniques	< 2 rem	Include "in the first year."
47	42	3.4.4	Emphasis needed	Exposure limits for re-entering relocation area	Emphasize that people entering the relocation area to WORK are to be controlled as occupational workers and not emergency workers.
48	47	3.8	Re-entry matrix	PAG levels	Change units back to "rem" instead of "mrem" OR change the PAG values in sections 2 and 3 to "mrem." It is confusing to change the units for this matrix.

ED_001057_00026684

RALPH L. ANDERSEN, CHP
Senior Director, Radiation Safety and
Environmental Protection

1201 F Street, NW, Suite 1100
Washington, DC 20004
P: 202.739.8111
rla@nei.org
nei.org

NUCLEAR ENERGY INSTITUTE

September 16, 2013

Air and Radiation Docket and Information Center
U.S. Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Avenue NW
Washington, DC 20460
ATTN: Docket ID No. EPA-HQ-OAR-2007-0268

Subject: Request for Comment on Updates to Protective Action Guides Manual: Protective Action Guides and Planning Guidance for Radiological Incidents, 78 Federal Register 22257, April 15, 2013

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)[1] provides the following comments in response to the subject Federal Register notice (FRN). These comments were developed by a group of industry experts in the areas of emergency preparedness and radiological protection drawn from the staff of companies that own and operate nuclear power reactors in the U.S. Our general comments are shown below and more detailed comments in response to specific questions posed in the FRN are included in the attachment.

America's nuclear energy facilities are designed and built to safely withstand a wide variety of natural and other severe events and are staffed around-the-clock by highly trained, federally licensed operators who are capable of taking the on-site actions necessary to mitigate and control the potential consequences of such events. Every U.S. nuclear power plant has a detailed emergency response plan developed in concert with local, state and federal government agencies, as well as local law-enforcement, fire-fighting and medical emergency response organizations, to protect public health and safety. Plant personnel that make up the facility's emergency response team, along with local first-responders, are continuously trained and drilled to maintain a high state of readiness to carry out the emergency response plan. All nuclear energy facilities participate in federally-evaluated, full-scale emergency response exercises every two years to identify and incorporate any needed improvements in the emergency response plans.

[1] The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

ED_001057_00026684

Protective action guides (PAGs) have been in effect for many years and play a key role in nuclear power plant emergency plans. PAGs for protecting public health and safety during the initial phase of an emergency event have been incorporated into each nuclear power plant's emergency plan since the time that the PAGs were established in 1980 and the emergency plans were updated when the PAGs were revised and expanded in 1992. The PAGs in the current emergency plans cover near-term protective measures such as sheltering, evacuation, administration of potassium iodide and setting restrictions on food and drinking water. Nuclear power plant emergency plans require that plant operators be able to make recommendations for protecting the public (based on the PAGs) to local and state authorities within 15 minutes of determining that an emergency event might result or has resulted in a significant radiological release. This capability is practiced and tested in the numerous drills and exercises conducted by plant staff and in conjunction with local, state and federal organizations.

The subject FRN conveys the most recent revision to the PAG manual that not only further updates the existing PAGs for the initial phase of an emergency, but also introduces PAGs for consideration of longer-term protective measures such as relocation, re-entry and recovery.

In forming our comments, we note that the updated PAG manual is intended to encompass "an expanded range of sources of potential radiological releases, including commercial nuclear power facilities, uranium fuel cycle facilities, nuclear weapons facilities, transportation accidents, radiopharmaceutical manufacturers and users, space vehicle launch and reentry, RDDs [radiological dispersion devices] and INDs [improvised nuclear devices]." We fully support such a comprehensive and integrated approach. Regardless of the specific circumstances that may be associated with different types of radiological emergencies, the radiation dose-based criteria used in protective action decision-making should be uniform and consistent to support effective and efficient planning, preparation and response to radiological emergencies.

In summary, we find that the updates to the PAG manual provide a more comprehensive and enhanced framework for decision-making during a radiological emergency that will continue to meet the essential principles for protecting public health and safety (as stated in the FRN) that underlie effective emergency planning, preparedness and response:

1. Prevent acute [radiological health] effects
2. Balance [radiological] protection with other important factors and ensure that actions result in more benefit than harm
3. Reduce risk of chronic [radiological health] effects

In developing and using the PAG manual, we believe that it is especially important to reinforce the essential principle of "balance" (#2 above) to help ensure that protective actions result in more benefit than harm. This importance was highlighted by the events in Japan following the earthquake, tsunami and nuclear accident in 2011. Some of the decisions taken for a single purpose (in this case, with the primary intent to protect

against radiation exposure) were extremely disruptive and may have resulted in more social harm than good – as recognized in recent publications regarding radiological protection issues and health risks associated with the Fukushima nuclear reactor accident[2,3]

The principle of balance is recognized, at least in part, in the PAG manual guidance for the late phase and in Department of Homeland Security-sponsored guidance being developed by the National Council on Radiation Protection and Measurements. We strongly endorse both efforts aimed at taking a more holistic approach to assessing protective options and empowering those who will be affected to participate more directly in decision-making. We suggest that this principle can also be more fully incorporated into the intermediate phase guidance related to relocation, reentry, and food and drinking water.

The PAG manual criteria include 2 rem in the first year and 500 mrem in subsequent years for relocation and reentry and highlight the Safe Drinking Water Act criteria for drinking water (e.g., 4 mrem per year for beta-gamma emitting radionuclides). These criteria are on the conservative end of comparable guidance from the ICRP[4] that includes a range of 2-10 rem in a year for "unusual, and often extreme, situations where actions taken to reduce exposures would be disruptive" and are substantially less than the 10 rem per year criterion recommended by the International Atomic Energy Agency[5] [IAEA General Safety Guide GSG-2]. The ICRP and IAEA criteria apply to all-pathways of exposure.

We suggest setting a range of 2-10 rem per year for all anticipated pathways of exposure (inclusive of consumption of food or drinking water) which would greatly provide enhanced flexibility for balancing avoidance of potential radiological health risks with risks and impacts associated with disruptive protective actions. In extreme and exigent situations where the use of contaminated food or water may be unavoidable (e.g., in the aftermath of a natural disaster or terrorist event that results in significant damage to critical infrastructure), an all-pathways approach will provide more-informed options for decision-making. In most other cases, where contaminated food and water can be effectively quarantined, the range would apply more exclusively to decision-making based on projected external exposure and inhalation of radionuclides.

We fully support implementation of the PAGs using the latest science by referring to dose calculations in the Federal Radiological Monitoring and Assessment Center (FRMAC) assessment manuals. The FRMAC assessment manuals utilize the radiation dosimetry models and dose coefficients recommended by the International Commission on Radiological Protection (ICRP) that reflect the most up-to-date scientific consensus on radiation units, quantities and methods and form the basis for global radiation safety standards,

---

[2] Gonzales, Abel J. et al. Radiological Protection Issues Arising During and After the Fukushima Nuclear Reactor Accident. J. Radiol. Prot. 33(497-571), IOP Publishing, Bristol (2013)

[3] World Health Organization. Health Risk Assessment from the Nuclear Accident after the 2011 Great East Japan Earthquake and Tsunami. World Health Organization, Geneva (2013)

[4] International Commission on Radiological Protection (ICRP). The 2007 Recommendations of the ICRP. ICRP Publication 103, Ann. ICRP 37(2-4), Elsevier, Amsterdam (2007)

[5] International Atomic Energy Agency (IAEA). Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency. General Safety Guide No. GSG-2, IAEA, Vienna, 2011

e.g., as adopted and endorsed by the International Atomic Energy Agency, World Health Organization, International Labor Organization, International Radiation Protection Association and others. Reference to the FRMAC assessment manuals will help facilitate standardization in radiation data collection, sharing and analysis, better uniformity between jurisdictions and for trans-boundary situations (e.g., between states and with neighboring countries) in considering protective actions, and more consistent and less error-prone communications between organizations and with the public.

We recognize and support incorporation of updated Food and Drug Administration (FDA) recommendations on the use of potassium iodide (KI) with a recommended protective action guide threshold of 5 rem projected child thyroid dose for administration of KI. We also support removal of the skin and thyroid dose criteria for considering evacuation "to avoid confusion with the KI threshold." However, in combination these two changes create the potential for scenarios in which KI administration might be recommended without a concurrent recommendation for evacuation or sheltering-in-place because the respective whole body dose threshold would not be projected to be exceeded. This approach appears to be a departure from past practice in which the administration of KI has been considered as a supplemental action to the primary protective actions of evacuation and sheltering-in-place. Additional discussion should be provided in the PAG manual to better clarify the intended priority and sequencing of protective actions for such scenarios.

Finally, we appreciate the stated objective to "streamline the manual to enhance usability." We believe that much will be learned in regard to the manual's usability during its actual implementation by state and local governments and other stakeholders. We suggest that the EPA consider establishing a means to obtain and address stakeholder feedback during the implementation period.

We appreciate the opportunity to provide our comments on the updated PAG manual. If you have any questions regarding our comments, please feel free to contact me.

Sincerely,

Ralph L. Andersen

Ralph L. Andersen

Attachment

"ANDERSEN, Ralph"
<rla@nei.org>

09/16/2013 02:03 PM

To Undisclosed recipients:;

cc

bcc

Subject Request for Comment on Updates to Protective Action Guides Manual: Protective Action Guides and Planning Guidance for Radiological Incidents

The attached cover letter contains complete contents of the letter.

September 16, 2013

Air and Radiation Docket and Information Center
U.S. Environmental Protection Agency
Mail Code: 6102T
1200 Pennsylvania Avenue NW
Washington, DC 20460
ATTN: Docket ID No. EPA-HQ-OAR-2007-0268

Subject: Request for Comment on Updates to Protective Action Guides Manual: Protective Action Guides and Planning Guidance for Radiological Incidents, 78 Federal Register 22257, April 15, 2013

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)[1] provides the following comments in response to the subject Federal Register notice (FRN). These comments were developed by a group of industry experts in the areas of emergency preparedness and radiological protection drawn from the staff of companies that own and operate nuclear power reactors in the U.S. Our general comments are shown below and more detailed comments in response to specific questions posed in the FRN are included in the attachment.

America's nuclear energy facilities are designed and built to safely withstand a wide variety of natural and other severe events and are staffed around-the-clock by highly trained, federally licensed operators who are capable of taking the on-site actions necessary to mitigate and control the potential consequences of such events. Every U.S. nuclear power plant has a detailed emergency response plan developed in concert with local, state and federal government agencies, as well as local law-enforcement, fire-fighting and medical emergency response organizations, to protect public health and safety. Plant personnel that make up the facility's emergency response team, along with local first-responders, are continuously trained and drilled to maintain a high state of readiness to carry out the emergency response plan. All nuclear energy facilities participate in federally-evaluated, full-scale emergency response exercises every two years to identify and incorporate any needed improvements in the emergency response plans.

Attachment

Ralph L. Andersen, CHP

Senior Director, Radiation Safety & Environmental Protection

Nuclear Energy Institute
1201 F Street, NW, Suite 1100
Washington, DC 20004
www.nei.org

P: 202-739-8111
F: 202-533-0144
E: rla@nei.org
T: @N_E_I

nuclear. clean air energy.

---

[1] The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

Now available: NEI's Online Congressional Resource Guide, ***Just the Facts!***
Web site address: www.NEI.org/CongressionalResourceGuide

FOLLOW US ON

This electronic message transmission contains information from the Nuclear Energy Institute, Inc. The information is intended solely for the use of the addressee and its use by any other person is not authorized. If you are not the intended recipient, you have received this communication in error, and any review, use, disclosure, copying or distribution of the contents of this communication is strictly prohibited. If you have received this electronic transmission in error, please notify the sender immediately by telephone or by electronic mail and permanently delete the original message. IRS Circular 230 disclosure: To ensure compliance with requirements imposed by the IRS and other taxing authorities, we inform you that any tax advice contained in this communication (including any attachments) is not intended or written to be used, and cannot be used, for the purpose of (i) avoiding penalties that may be imposed on any taxpayer or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.

Sent through mail.messaging.microsoft.com

09-16-13_EPA_Comment on Updates to Protective Action Guides for Radiological Incidents.pdf

09-16-13_EPA_Comments on Updates to Protective Action Guides for Radiological Incidents_Attachment.pdf

Detailed Comments on EPA PAG Manual 2013

Nuclear Energy Institute (NEI)

Dose Modeling Methods

- NEI concurs with the EPA approach to use ICRP-60 dose modeling methods and concurs with the use of FRMAC method to the extent dose modeling uses ICRP-60 principles
- The PAG Manual values for the Early Phase (Table 2-1) and Intermediate Phase (Table 3-1) differ significantly from corresponding international criteria recommended by the International Atomic Energy Agency.[1] The PAG Manual includes a range of 1-5 rem for consideration of early phase evacuation or sheltering-in-place compared with the international criterion of 10 rem (based on a reference level range of 2-10 rem) and intermediate phase values for relocation and other dose reduction actions of 2 rem in the first year and 0.5 rem in subsequent years compared with the international criterion of 10 rem per year. The PAG Manual and international recommendations share similar underlying principles for criteria for protective actions, e.g., to avoid acute health effects and to reduce the risk of chronic health effects. Even considering potential differences in how the protective action criteria might be applied, e.g., calculation methods and pathway selection, the PAG Manual values appear to be decidedly conservative when compared to international criteria. We suggest that the EPA should evaluate and rationalize the differences between the PAG Manual values and current[2] international criteria as an appropriate enhancement to the basis for the early and intermediate phase PAGs.
- NEI concurs with the concept of not evaluating unavoidable dose that occurs prior to the point at which protective actions are initially considered.

Drinking Water PAGs

- Protective action decisions related to drinking water occur in the Intermediate and Late Phases and generally not in the early phase of an event. These are often referred to as the Reentry and Reoccupation phases. As such, the PAG values should reflect longer exposure times than are likely to occur in Phase 1 and populations that are likely to extend beyond the emergency planning zones (EPZs) for nuclear power reactors as described in NUREG 0396. Furthermore, the PAGs for drinking water should reflect the nature of the conditions as an emergency and recognize the distinction between responses and protective actions in different phases of the response.
- NEI does not support the EPA conclusion that it is not necessary to offer specific dose or concentration guidelines for drinking water in the PAG Manual 2013. Instead, EPA recommends use of the National Primary Drinking Water Regulations (NPDWR). The NPDWR values are appropriate for on-going, lifetime exposures in non-emergency, normal life conditions. Clearly, Phases 1 (acute) and 2 (reentry / recovery) are special and highly unusual circumstances for which routine drinking

[1] International Atomic Energy Agency (IAEA). Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency. General Safety Guide No. GSG-2, IAEA, Vienna, 2011

[2] Note that the only reference in the PAG Manual to international criteria is in regard to a 1989 version of IAEA recommendations.

water characteristics described in the NPDWR should not be imposed. Only in Phase 3 (reoccupation) is it reasonable to consider normal drinking water limits for radionuclides as found in the NPDWR. Drinking water data for radionuclides in the NPDWR are designed for municipal water systems that provide the sole source of drinking water to large populations. Thus, the NPDWR concentration limits are designed to achieve doses orders of magnitude lower than those for which any health effects have been observed. The NPDWR drinking water concentration limits are largely based on the concept of the Linear Non-Threshold Theory (LNT) which is not appropriate for protective actions in emergency responses. Thus, EPA should make specific recommendations that are based on avoidance of long-term health effects in Phases 2 and 3. The recommended values for drinking water in Phase 2 and 3 emergency responses should be developed using dosimetric methods that may consider but should not rely upon LNT theories. Empirical health effects data from actual radiological contamination experience of drinking water should be used in informing the development of radionuclide specific guidance for Phase 2 and Phase 3 conditions for the various types of events considered (nuclear reactor accidents, radioactive dispersal devices, and improvised nuclear devices). Event specific radionuclide guidance is appropriate because the source terms (isotopes) are very different from one type event to the other.

Use of Potassium Iodide (KI)

- Reliance on the Chernobyl experiences as a basis for United States PAGs may be somewhat misplaced given that the national and local authorities did not take early action to inform the public of the nature of the event and to interdict certain food sources. We anticipate that in the United States, unlike in the case of Chernobyl, the public would be informed early and sources of radioactive iodine in food and water would be identified promptly and interdiction actions taken.

Skin and Thyroid Dose Evacuation Criteria

- Skin related exposures are bounded by whole body doses when considering potential accidents from nuclear power reactors. As such, no special evacuation criteria are necessary for exposures arising from events at nuclear power reactors.

Eliminating 5 rem over 50 year Relocation Guidance

- Decisions on long-term relocation and reoccupancy are exceedingly complex and must consider a wide variety of factors. Projected radiation dose is an important consideration, however, factors such as the potential economic and societal benefits from reoccupancy should be considered.
- Due to the complexity of such decisions, simple guidance might be offered in a PAG Manual is insufficient. PAGs for long-term relocation and reoccupancy can reasonably be addressed at the time of an event taking into consideration the unique aspects of the circumstances.

ED_001057_00026684

Usefulness of Combined Pathways for Dose Modeling

- We believe that the use of FRMAC assessment methods that rely upon current ICRP recommendations for external whole body and internal dose determination is appropriate.
- The use of the concept of Total Effective Dose Equivalent (TEDE) is an appropriate measure of radiation exposure risk that is well understood.

Remediation Guidance

- General guidance as provided in Chapter 4 of the draft PAG Manual is reasonable. The Manual appropriately recognizes that remediation decisions must take into account a wide variety of factors which may not be described analytically in advance of a particular event.

Waste Disposal Guidance

- The introduction of issues and discussion of a range of actions is appropriate for this Manual. However, the document states that state governments are responsible for waste disposal. This is an unreasonable assignment of responsibility for events involving significant contamination of land or structures. This topic deserves separate and more extensive discussion between federal, state and local governments and other stakeholders that is well beyond the process of producing this update to the PAG Manual.

ED_001057_00026684

Exelon Generation®

200 Exelon Way
Kennett Square, PA 19348
www.exeloncorp.com

September 12, 2013

SEP 17 2013

U.S. Environmental Protection Agency
Air and Radiation Docket and Information Center
Mail Code: 6102T
1200 Pennsylvania Ave NW
Washington, DC 20460
Attn: Docket ID EPA–HQ–OAR–2007–0268

Subject: Comments Concerning Updates to Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents (78FR22257, dated April 15, 2013, Docket ID EPA–HQ–OAR–2007–0268)

This letter is being submitted in response to the U.S. Environmental Protection Agency (EPA) request for comments concerning *"Updates to Protective Action Guides Manual: Protective Action Guides (PAGs) and Planning Guidance for Radiological Incidents,"* which was published in the *Federal Register* on April 15, 2013 (i.e., 78FR22257).

As part of EPA's mission, EPA publishes PAGs to help Federal, State, local, and tribal emergency response officials make radiation protection decisions during emergencies. The EPA, in coordination with a multi-agency working group within the Federal Radiological Preparedness Coordinating Committee (FRPCC), has proposed updates to the "1992 Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" (i.e., 1992 PAG Manual - EPA 400–R–92–001, May 1992). The updated guidance contained in the revised 2013 PAG Manual, *"Protective Action Guides and Planning Guidance for Radiological Incidents,"* applies the PAGs to incidents other than just nuclear power plant accidents, updates the radiation dosimetry and dose calculations based on current science, and incorporates late phase guidance.

Exelon Generation Company, LLC (Exelon) appreciates the opportunity to comment on the proposed updates to the PAG Manual. Exelon supports the comments submitted by the Nuclear Energy Institute (NEI) on behalf of the industry related to this subject.

Respectfully,

D. P. Helker

SEP 12 2013

David P. Helker
Manager, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

To: Fraass, Ron[Fraass.Ron@epa.gov]
Cc: Griggs, John[Griggs.John@epa.gov]
From: Veal, Lee
Sent: Mon 12/9/2013 5:30:56 PM
Subject: Tomorrow
EPA Rad ER for Janet 12-1-2013 DRAFT FOR FINAL REVIEW.pptx

Good morning/afternoon Ron,

Not sure which time zone you are in right now...our brief with Janet is in the same building, on the 5th floor, room 5400. The RMs meet on the 3rd floor. Mike Boyd and I are going to the EOC early tomorrow for a meeting with Juan and the Japanese (video conference). Want to join for curiosity (7:30am-9:00am in EOC event room 3) or meet right after? I will be free at 9am.

For the ER Brief, I was able to connect with John Griggs on Friday from home. Here are my thoughts:

Ex. 5 - Deliberative Process

Given the likelihood that we'll have more bad weather overnight, and possibly schedule crunches through Tuesday, we may wind up with a 30 minute window rather than 50 minutes, let's think about our key messages or essentials for Janet.

Ex. 5 - Deliberative Process

How does that sound?
Lee

Lee Ann B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division, ORIA, OAR

Office: 202-343-9448
Cell: 202-617-4322

-----Original Message-----
From: Fraass, Ron
Sent: Monday, December 09, 2013 8:59 AM
To: Veal, Lee

Subject: Speaker order and slides

Ex. 5 - Deliberative Process

To: DeCair, Sara[DeCair.Sara@epa.gov]
From: Veal, Lee
Sent: Mon 9/30/2013 4:58:23 PM
Subject: RE: KI reading as you think about PAGs comments

I began reading the KI book….took a little nappy, forgot my place. ZZZZZ

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Office: 202-343-9448

Cell: 202-617-4322

From: DeCair, Sara
Sent: Monday, September 30, 2013 8:46 AM
To: Andrew.Wallo@eh.doe.gov; asa4@cdc.gov; ben.cacioppo@dtra.mil; Carlos.Corredor@Hq.Doe.Gov; Edward.Regnier@hq.doe.gov; John.Jensen@dm.usda.gov; john.mackinney@dhs.gov; john.madrid@dtra.mil; lee.a.nickel1@navy.mil; lodwick.jeffrey@dol.gov; michael.howe@fema.dhs.gov; Michael.Noska@fda.hhs.gov; Patricia.Milligan@nrc.gov; paul.ward@fema.dhs.gov; ricardo.a.reyes@us.army.mil; siddhanti@endyna.com; tdkraus@sandia.gov; Veal, Lee; william.cunningham@nist.gov
Subject: KI reading as you think about PAGs comments

PAG Subcommittee, as you think about the KI comments we discussed last week, consider re-reading the NAS study from 2004 and follow on activities HHS, NRC, and FRPCC did to respond to the 20-mile potential new EPZ for KI.

I hope you have a copy of NAS's study in your office:
http://books.nap.edu/openbook.php?isbn=0309090989&page=1

See NRC's very informative web description below: http://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/potassium-iodide.html#distribution

Distribution of KI Within 20-Mile Radius of Nuclear Power Plants

Section 127 of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act) requires State and local governments through the national KI stockpile to distribute KI tablets to population within 20 miles of a nuclear power plant. The Bioterrorism Act also directed the National Academy of Sciences (NAS) to study the expanded distribution of potassium iodide and report back to the President on the best distribution methods to accomplish such an expanded distribution. The NAS published this study in January 2004.

On August 29, 2005, the Department of Health and Human Services (HHS) published draft guidelines for State, local, and tribal governments, for the expanded distribution, stockpiling, and utilization of KI in the event of a radioactive iodine release from a commercial nuclear power plant incident. On September 2, 2005, HHS issued a correction to add deadline for receiving public comments. The NRC provided comments to the draft guidelines on November 1, 2005.

On July 3, 2007, President Bush delegated his authority to invoke the waiver provision in Section 127 to his science advisor, Dr. Marbuger, Director of the Office of Science and Technology Policy at the White House. In a January 22, 2008 memo, Dr. Marburger announced his decision to invoke the Section 127(f) waiver. A technical paper on the issue of KI was prepared by the Federal Radiological Protection Coordinating Committee KI Sub-Committee at the request of Dr. Marburger as part of his determination process.

To: Edwards, Jonathan[Edwards.Jonathan@epa.gov]
From: Veal, Lee
Sent: Fri 4/12/2013 6:09:43 PM
Subject: Re-entry

3.7 Reentry during the Early and Intermediate Phases (pages 46-49)

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

3.8 Reentry Matrix following a Radiological Incident or Accident

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Mail Code 6608J

1200 Pennsylvania Avenue, NW

Washington DC 20460

Office: 202-343-9448

Cell: 202-617-4322

---

[1] PAGs Manual online at http://www.epa.gov/rpdweb00/rert/pags.html.

[2] The Operational Guidelines were developed by federal agencies and published in draft form by DOE in February 2009 with DOE reference number DOE/HS-0001; ANL/EVS/TM/09-1, on-line at http://ogcms.energy.gov/review.html.

[3] FRMAC Assessment Manual, Overview and Methods online at: http://www.nv.doe.gov/nationalsecurity/homelandsecurity/frmac/manuals.aspx.

To: McMichael, Nate[McMichael.Nate@epa.gov]; Valentine, Julia[Valentine.Julia@epa.gov]; Millett, John[Millett.John@epa.gov]; DeCair, Sara[DeCair.Sara@epa.gov]
Cc: Edwards, Jonathan[Edwards.Jonathan@epa.gov]; Forinash, Betsy[Forinash.Betsy@epa.gov]
From: Veal, Lee
Sent: Thur 4/11/2013 3:06:26 PM
Subject: RE: PAGs in Forbes

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Mail Code 6608J

1200 Pennsylvania Avenue, NW

Washington DC 20460

Office: 202-343-9448

Cell: 202-617-4322

From: McMichael, Nate
Sent: Thursday, April 11, 2013 10:14 AM
To: Valentine, Julia; Veal, Lee; Millett, John; DeCair, Sara
Subject: PAGs in Forbes

Ex. 5 - Deliberative Process

http://www.forbes.com/sites/jeffmcmahon/2013/04/10/epa-draft-stirs-fears-of-radically-relaxed-radiation-guidelines/

EPA Draft Stirs Fears of Radically Relaxed Radiation Guidelines

The acting EPA director on Friday signed a revised version of the EPA's Protective Action Guide for radiological incidents, which critics say radically relaxes the safety guidelines agencies follow in the wake of a nuclear-reactor meltdown, dirty-bomb attack, or other unexpected release of radiation.

Although the document is a draft published for public comment, it takes effect as an "interim use" guideline. And according to Public Employees for Environmental Responsibility (PEER), that means agencies responding to radiation emergencies may permit many more civilian fatalities.

"In soil, the PAGs allow long-term public exposure to radiation in amounts as high as 2,000 millirems," PEER advocacy director Kirsten Stade said in a press release. "This would, in effect, increase a longstanding 1 in 10,000 person cancer rate to a rate of 1 in 23 persons exposed over a 30-year period."

The non-binding document does not relax EPA's standards, the agency has said in response to the criticism. But it directs agencies responding to radiation releases to standards at other agencies that are less stringent than EPA. Douglas Guarino has the scoop at NextGov, a publication that follows technology and government:

> The new version of the guide released Friday does not include such dramatically relaxed guidelines its text, but directs the reader to similar recommendations made by other federal agencies and international organizations in various documents. It suggests that they might be worth considering in circumstances where complying with [EPA's] own enforceable drinking water regulations is deemed impractical....
>
> For example, the new EPA guide refers to International Atomic Energy Agency guidelines that suggest intervention is not necessary until drinking water is contaminated with radioactive iodine 131 at a concentration of 81,000 picocuries per liter. This is 27,000 times less stringent than the EPA rule of 3 picocuries per liter.

via EPA Relaxes Public Health Guidelines For Radiological Attacks, Accidents – Nextgov.com.

That EPA rule was designed for a lifetime of exposure, the IAEA guideline for short-term exposure.

The document was signed Friday by acting EPA Administrator Bob Perciasepe, but it developed under the Bush Administration and was revised under the supervision of Obama's nominee for the top EPA post, Gina McCarthy, who has headed EPA's Office of Air and Radiation since 2009. McCarthy faces a confirmation hearing before the Senate Environment and Public Works Committee on Thursday.

EPA spokeswoman Julia Valentine told the Global Security Newswire that the agency "is not weakening cleanup standards," but "building a bridge between managing the effects of a catastrophe and meeting existing environmental standards." EPA updated the document to bring the science to current standards and to give agencies more guidance and flexibility in the wake of a catastrophe than a reiteration of EPA's standards.

In a notice published Friday, Perciasepe states:

The 2013 PAG Manual is not a legally binding regulation or standard and does not supersede any environmental laws; PAGs are not intended to define "safe" or "unsafe" levels of exposure or contamination. This guidance does not address or impact site cleanups occurring under other statutory authorities such as the United States Environmental Protection Agency's (EPA) Superfund program, the Nuclear Regulatory Commission's (NRC) decommissioning program, or other federal or state cleanup programs. As indicated by the use of non-mandatory language such as "may," "should" and "can," the 2013 Manual only provides recommendations and does not confer any legal rights or impose any legally binding requirements upon any member of the public, states, or any other federal agency. Rather, the 2013 PAG Manual recommends projected radiation doses at which specific actions may be warranted in order to reduce or avoid that dose. The 2013 PAG Manual is designed to provide flexibility to be more or less restrictive as deemed appropriate by decision makers based on the unique characteristics of the incident and the local situation.

The full draft "PAG Manual" is available here (pdf).

Nate McMichael

US EPA- Office of Air and Radiation

202-564-0382 (Office)

202-236-4176 (Cell)

To: Forinash, Betsy[Forinash.Betsy@epa.gov]
From: Veal, Lee
Sent: Wed 4/10/2013 9:13:14 PM
Subject: FW: Attention: Docket ID No. EPA - HQ - OAR - 2007 - 0268

I asked Ray Lee to hold on these until Sara gets back.

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Mail Code 6608J

1200 Pennsylvania Avenue, NW

Washington DC 20460

Office: 202-343-9448

Cell: 202-617-4322

From: Lee, Raymond
Sent: Wednesday, April 10, 2013 11:55 AM
To: Veal, Lee
Subject: FW: Attention: Docket ID No. EPA - HQ - OAR - 2007 - 0268

Hi Lee,

Just FYI – I sent this to Sara but I know she's on travel today.

Thanks,

Ray

From: Lee, Raymond
Sent: Wednesday, April 10, 2013 11:16 AM
To: DeCair, Sara
Subject: FW: Attention: Docket ID No. EPA - HQ - OAR - 2007 - 0268

Hi Sara,

Wow – we got an early commenter! Of course this isn't live until the docket goes public (which should be today or tomorrow) – scroll down to the bottom of Amparo's e-mail.

Ex. 5 - Deliberative Process

Thanks,

Ray

From: Castillo, Amparo
Sent: Wednesday, April 10, 2013 10:46 AM
To: Lee, Raymond
Cc: Akram, Assem
Subject: FW: Attention: Docket ID No. EPA - HQ - OAR - 2007 - 0268

Hi

Guess what?

You already got an early comment on our group box.

Once the FR comes out it'll be added to the docket as an early submission.

Regards,

Ms. Amparo Castillo
OA/OARM/OECA/OEI/OGC/ORD/TRI Docket Manager

OAR/OW Assistant Docket Manager

USEPA Docket Center

ASRC Primus Solutions - Contractor

USEPA West, Room 3337, MC 28221T
Phone: 202-566-1743

Email: castillo.amparo@epa.gov

----- Forwarded by Bercenia Johnson/DC/USEPA/US on 04/10/2013 10:39 AM -----

darnoc@crestofthewave.com

04/10/2013 08:18 AM

ToGroup A-AND-R-DOCKET@EPA

cc

SubjectAttention: Docket ID No. EPA - HQ - OAR - 2007 - 0268

Attention: Docket ID No. EPA-HQ-OAR-2007-0268 re PAGS on radiation standards
Dear EPA, What you have concocted here is an immoral impractical cancer-raising set of PAGS that absolutely belongs in the trash heap. By conflating dirty bombs, nuclear bombs, nuclear power plant accidents etc. you say it is OK to have ridiculous levels of radiation exposure that are way beyond unacceptable, and you have made it difficult to decipher how to reference what you are using as regulations. For example, you want to use the pro-nuclear facilitating IAEA (they are NOT a 'watchdog' agency!) as your reference to permit the exposure of 81,000 picocuries per liter of

iodine-131 as acceptable exposure when it is currently 3 (three) picocuries per liter!!

Another terrible example specifically re dirty bombs:

'The Department of Homeland Security (DHS) has issued guidance for responding to a terrorist detonation of a radiological weapon, a so-called "dirty bomb." In that guidance, DHS proposes permitting the public back into a contaminated area even if radiation doses are as high as 10,000 millirem per year. Over 30 years of exposure, that is the equivalent of 50,000 chest X-rays. The government's own official risk estimates say such exposure would cause cancer in a quarter of the people exposed.' PLUS: normal background radiation is really only 200 millirems per year, tho that standard was raised to be over 600 recently.

We must not RAISE allowable radiation exposure for the benefit of the nuclear industry and their mistakes and inevitable leaks, and possibly the next Fukushima happening here. We must PROTECT our fellow citizens from the harm of radiation Allowing radioactive metals to be sold into the marketplace unlabelled, and water to be ingested that is way too radioactive to be safely ingested is not what the EPA is supposed to be doing. This is atrocious, and I and many Americans aware of what you are doing are outraged at your irresponsible behavior.

These new PAGS must be removed, struck down, disallowed, erased from the insanity of this nuclear era that mankind must pass thru before we destroy ourselves. Remember what Japan's former Prime Minister Naoto Kan said:

"I think that nuclear plants are not, and never will be, justifiable economically, and will not exist in the future….In that sense I believe that nuclear power has only existed as a transitional and temporary energy source, and that the technology will not and should not exist in the next century…"
Naoto Kan - Prime Minister of Japan during the Fukushima Crisis/Disaster, which began March 11, 2011. Video address to the Fukushima Symposium March 11, 2013, NYC, NY, USA.

Respectfully, but Disgustedly,
Conrad Miller MD
PS And why doesn't the docket number come up as a match when I try to access it to post this comment on www.regulations.com ???
Southampton, NY

To: Gillam, Connie[Gillam.Connie@epa.gov]
Cc: Lee, Raymond[Lee.Raymond@epa.gov]; DeCair, Sara[DeCair.Sara@epa.gov]; Nesky, Anthony[Nesky.Tony@epa.gov]; Edwards, Jonathan[Edwards.Jonathan@epa.gov]; Perrin, Alan[Perrin.Alan@epa.gov]
From: Veal, Lee
Sent: Mon 4/1/2013 4:09:50 PM
Subject: RE: Memos for the PAG document
PAG Manual clean version 3-29-2013.docx
PAG Manual clean version 3-29-2013.pdf
PAGs FR clean version 3-18-2013.pdf

Connie,

Here are copies of the attachments in PDF (not sure where all we'll need what, but someone will tell us shortly).

Also the revised PAG manual, clean copy, with the word DRAFT removed from the header. I did not see anything on the FR notice, but let's print and make sure all is well.

Lee

From: Veal, Lee
Sent: Monday, April 01, 2013 11:30 AM
To: Gillam, Connie
Cc: Lee, Raymond; DeCair, Sara; Nesky, Anthony; Edwards, Jonathan; Perrin, Alan
Subject: Memos for the PAG document

Connie,

Would you please finalize the two attached memos and help me put together a hard copy package to get to Mike for signature?

Here are the memo files, the PAG document, the FR document, key messages, and desk statement (last two for reference). We have a separate internal communications plan if that is needed.

I believe that the cross-page watermarks have been removed from the PAG and FR documents, but please let's verify as it is printed.

Lee

Lee Ann B. Veal

Director, Center for Radiological Emergency Management

Radiation Protection Division, ORIA, OAR

Mail Code 6608J

1200 Pennsylvania Avenue, NW

Washington DC 20460

Office: 202-343-9448

Cell: 202-617-4322

To: Walker, Stuart[Walker.Stuart@epa.gov]
From: Anderson, RobinM
Sent: Tue 10/29/2013 3:07:42 PM
Subject: Inside EPA Pags

Daily News

State Regulators Split On EPA Radiological Guide's Drinking Water Level

Posted: October 28, 2013

Members of a state waste regulators group are conflicted over EPA's suggestion to develop a short-term emergency drinking water level following a radiological emergency as part of a draft radiological protection guide, while industry is calling for less-stringent requirements in the guide and environmental groups are reiterating their opposition to EPA's proposal.

In addition, states including members of the Association of State & Territorial Solid Waste Management Officials (ASTSWMO) as well as industry commenters on EPA's draft "Protective Action Guides and Planning Guidance for Radiological Incidents," known as the PAG for radiological incidents, are criticizing EPA for its assumptions that radioactive waste disposal following emergencies would fall only to the responsibility of states.

The guide is aimed at helping federal, state, local and tribal emergency response officials make radiation protection decisions during emergencies, according to EPA. The agency closed public comment on the draft PAG Sept. 16.

Some of the comments from ASTSWMO and environmental groups like Beyond Nuclear echo those made earlier by some states and environmentalists.

For instance, a few states previously have called on EPA to develop a specific drinking water level for the intermediate aftermath of a radiological emergency outside of the agency's traditional strict drinking water levels, while more than 100 environmental and citizen groups signed onto comments calling on EPA to drop all efforts to establish a drinking water protective level that is weaker than Safe Drinking Water Act (SDWA) limits.

Among the issues on which EPA sought feedback was the possibility of an intermediate -- what it dubs a "short-term" -- emergency drinking water PAG. EPA did not include such a standard in the draft, but asked for comment on the matter, and alludes in footnotes to several approaches by other entities that environmentalists say would be far less stringent than what SDWA permits.

Enforceable SDWA standards for radionuclides exist, but EPA says in the draft guide that it is not currently proposing a specific drinking water PAG. Rather, the agency advises that to the extent practicable, emergency measures for drinking water should be based on the National Primary Drinking Water Regulations (NPDWR) for Radionuclides, which give states flexibility when responding to radiological events.

If a public water system exceeds the NPDWR, it must work to return to compliance as soon as feasible, EPA says. The NPDWR provides for a regulatory standard of 4 millirems (mrem)/year based on lifetime exposure, but EPA says it is asking for input on an approach and technical rationale for a drinking water PAG for an emergency's intermediate phase -- generally considered from one year to seven years after the emergency -- to help officials determine protective actions under emergency conditions when exposures occur over shorter time periods than those expected in the NPDWR.

ASTSWMO's Sept. 13 comments are a varied collection of responses from the individual members of the group's radiation panel, with one state agreeing with the concept of including such a PAG, while another calling for using EPA's strict drinking water standards, known as maximum contaminant levels (MCLs), "when possible" during the early phase of such an emergency. A third state cautions against using any such water -- which would not meet EPA's MCLs -- for ingestion purposes.

A fourth state commenter says only in "*extreme* circumstances" could dose assessments be calculated that would correspond with the dose determined to be acceptable for the event by technical working groups. "This information would be communicated by decision makers or their designated public information officers."

And another ASTSWMO commenter says the threshold for a water standard, particularly in the first year, may be too stringent.

Industry's Comments

Industry is generally dismissing any use of NPDWR levels for the early or intermediate time periods following an emergency. In Sept. 16 comments, the Nuclear Energy Institute (NEI) says NPDWR values are appropriate for lifetime exposures in non-emergencies, while acute emergencies and intermediate time periods "are special and highly unusual circumstances for which routine drinking water characteristics described in the NPDWR should not be imposed."

In general, NEI says the updated draft PAG document offers "a more comprehensive and enhanced framework for decision-making during a radiological emergency that will continue to meet the essential principles for protecting public health and safety . . . that underlie effective emergency planning, preparedness and response."

Industry is also emphasizing the principle of balancing radiological protection with other factors and ensuring that actions provide more benefit than harm. NEI says this importance was highlighted by the actions taken in Japan following the tsunami-related nuclear accident there in 2011. "Some of the decisions taken for a single purpose (in this case, with the primary intent to protect against radiation exposure) were extremely disruptive and may have resulted in more social harm than good -- as recognized in recent publications regarding radiological protection issues and health risks associated with the Fukushima nuclear reactor accident," the comments say.

The group suggests EPA's limits for risks are conservative for the first year after an accident and in intermediate subsequent years. EPA's proposal suggests criteria of 2 rem in the first year, followed by 500 mrem in subsequent intermediate years. "We suggest setting a range of 2-10 rem per year for all anticipated pathways of exposure (inclusive of consumption of food or drinking water) which would greatly provide enhanced flexibility for balancing avoidance of potential radiological health risks with risks and impacts associated with disruptive protective actions," NEI says.

But environmentalists in recently filed comments are countering arguments about the lessons from the Fukushima accident.

In comments submitted by Beyond Nuclear, the group says the Japanese government, rather than relocating people, is attempting to persuade families that it is safe to live in contaminated areas. "EPA's PAGs would allow the same fate for U.S. victims of a nuclear catastrophe," the group says.

And the groups Alliance for a Green Economy and New York-based Citizens' Environmental Coalition write in Sept. 16 joint comments that the EPA proposal gives on-site emergency managers "extraordinary flexibility" following nuclear power plant accidents, the use of "dirty bombs" or other radiological incidents. EPA has moved away from its public health protection levels of between one in 10,000 and one in a 1 million cancers, according to the groups. "Under this guidance EPA would be allowing a rate of 1 in 23 [cancers] for a person exposed over a 30 year period," they say. They say the PAG should be scrapped and EPA should start over.

These groups also raise concerns that the guidance "allows for a broader range of actions which could enable sending radioactive materials to ordinary landfills and applying these standards to site clean-ups, such as those managed by the Department of Energy or the Nuclear Regulatory Commission."

EPA's Assumptions

Some commenters are also raising concerns over the assumptions EPA makes about waste disposal from radiological emergencies. Washington state's Department of Health, for instance, says in Sept. 10 comments that an act of terrorism that would cause the need to dispose of radiological waste should not solely fall on states' shoulders.

"To place this responsibility entirely on a state would bring about economic conditions that could possibly bankrupt state and local jurisdictions," it says.

NEI agrees that placing all responsibility for waste disposal on states "is an unreasonable assignment of responsibility for events involving significant contamination of land or structures." This issue should be further discussed between federal, state and local governments and other stakeholders, it says.

One ASTSWMO commenter expressed similar concerns, noting that there are numerous scenarios where waste disposal would not solely be a state issue.

"A large release could lead to low level waste volumes that are impossible to store realistically," the commenter says. "Standards need to be developed that ensure that the amount of low level waste generated can be accommodated at existing low level waste storage facilities. States are looking for realistic solutions."

Robin M. Anderson

OSRTI/ARD/SARDB

703-603-8747

Quick question: I assuming your dose estimates are in units of mrem per pCi/m3. not just mrem, correct? Hence, when you divide the PAG (1000 mrem) by the total mrem per pCi/m3, your get the DRL in pCi/m3? Thanks, Lowell

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/31/2011 01:06:28 PM---Here is a spreadsheet. Data only need to be entered in "colored" fields (red, green or blue). Defa

From: Scott Telofski/MTG/USEPA/US
To: Lowell Ralston/DC/USEPA/US@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA
Date: 03/31/2011 01:06 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Here is a spreadsheet. Data only need to be entered in "colored" fields (red, green or blue). Default values are entered.

[attachment "Dose Calculation Spreadsheet.xlsx" deleted by Lowell Ralston/DC/USEPA/US]

Lowell Ralston---03/31/2011 05:02:10 AM---Scott, Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calc

From: Lowell Ralston/DC/USEPA/US

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Bonnie Gitlin/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA

Date: 03/31/2011 05:02 AM

Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Scott,

Thank you!. Would you please send me your spreadsheet(s) so I can understand/check your calculations and parameter values? A second pair of eyes always helps!

Lowell

Lowell G. Ralston, PhD
Radiation Protection Division
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
Washington, DC 20460

202-343-9831 voice
202-343-2305 fax
ralston.lowell@epa.gov

Scott Telofski---03/30/2011 04:24:35 PM---Here is the table for Cs-137. Calculations are the same as those for I-131 particulates, with the e

From: Scott Telofski/MTG/USEPA/US
To: EOC Environmental Unit@EPA
Cc: Bonnie Gitlin/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Lowell Ralston/DC/USEPA/US@EPA, Ron Fraass/MTG/USEPA/US@EPA, Schatzi Fitz-James/DC/USEPA/US@EPA
Date: 03/30/2011 04:24 PM
Subject: Re: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Here is the table for Cs-137. Calculations are the same as those for I-131 particulates, with the exception of the short-lived daughter, Ba-137m, being in equilibrium at the appropriate ratio with Cs-137.

Not sure what we are doing about food/milk/water in the table, so I haven't done those. Let me know if we want them in and I will add them.

I also took the liberty to run Cs-134 and make a table as well. I will forward that if desired.

[attachment "Air Particulate Trigger Levels for Cs-137.docx" deleted by Lowell Ralston/DC/USEPA/US]

EOC Environmental Unit---03/30/2011 12:59:17 PM---Hi Scott: Jon Edwards has proactively requested a protective action guides table for Cs-137 similar

From: EOC Environmental Unit

To: Scott Telofski/MTG/USEPA/US@EPA

Cc: Lowell Ralston/DC/USEPA/US@EPA, EOC Environmental Unit@EPA, Ron Fraass/MTG/USEPA/US@EPA, Bonnie Gitlin/DC/USEPA/US@EPA

Date: 03/30/2011 12:59 PM

Subject: ACTION: PAGs for Radiological Incidents and Trigger Levels for Cs-137 Sampled in the US After JNI

Hi Scott:
Jon Edwards has proactively requested a protective action guides table for Cs-137 similar to the one you and others prepared for I-131 in the last several days. I understand you are the go to person to make this happen: -)

Please send us the Cs-137 PAG table by Noon EDT March 31 and let us know if you have questions.
Thank you!
Schatzi

Subject: Update on Monday's Busy Agenda
To: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA CN=Mike Boyd/OU=DC/O=USEPA/C=US@EPA CN=Rafaela Ferguson/OU=DC/O=USEPA/C=US@EPA
From: CN=Lee Veal/OU=DC/O=USEPA/C=US
Submit Time: 8/4/2011 10:16:31

Jon,

I'd like to give you an update on several meetings taking place on Monday, August 8.

1. **PAGs discussion with OMB Staff**, 1pm. There is a 30-minute OMB staff level conference call scheduled for 1pm to answer a few of OMB's initial questions on the draft PAGs package. Sara DeCair will be on vacation but calling in. Alan Perrin, Darrell Liles, Bill Nickerson will be on for EPA. Margo Schwab and a new person, Chad Whiteman from OMB.

2. **ISCORS.** You are in the ISCORS meeting all afternoon. I'll present on the Japan event, roughly 20 minutes beginning in a 1pm session. I'll need to leave just before 2pm.

3. **R9/R10 AAR** Conference call at 2pm-3pm. I scheduled this some time ago with Regions 9, 10, OEM, OEA to discuss their RAs' letter to Bob P on doing a Fukushima event after action review. This call should close the loop on any outstanding issues for those 2 Regions (at least it is my goal.)

4. **Air Division Directors' Call at 4pm**. I am planning to cover the Japan portion of the call. I'm preparing a 1-2 pager to share ahead of time and will send that to you and others today.

Lee

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Party on Garth.....

Lee B. Veal
Director, Center for Radiological Emergency Management
Radiation Protection Division
Office of Radiation and Indoor Air
Environmental Protection Agency
1310 L Street, NW
Washington DC, 20005
Mail Code: 6608J
202-343-9448
cell 202-617-4322

Sara DeCair---09/30/2010 05:00:31 PM---Hm... ----- Forwarded by Sara DeCair/DC/USEPA/US on 09/30/2010 05:02 PM -----

From: Sara DeCair/DC/USEPA/US

To: Alan Perrin/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA

Date: 09/30/2010 05:00 PM

Subject: Fw: PAGs Subcmte: Best time for a call?

Hm...

----- Forwarded by Sara DeCair/DC/USEPA/US on 09/30/2010 05:02 PM -----

From: Jean Schumann/DC/USEPA/US

To: Sara DeCair/DC/USEPA/US@EPA

Date: 09/30/2010 04:57 PM

Subject: Re: PAGs Subcmte: Best time for a call?

I'm on vacation the next 2 weeks, so won't be able to participate.

Jean Schumann
Office of Emergency Management
U.S. Environmental Protection Agency
Phone: (202) 564-1977
schumann.jean@epa.gov

Sara DeCair---09/29/2010 08:20:51 AM---PAGs Subcommittee, We'd like to hold a PAGs Subcommittee conference call soon to discuss next steps

From: Sara DeCair/DC/USEPA/US

To: Andrew.Wallo@eh.doe.gov, cym3@cdc.gov, man@cdrh.fda.gov, patricia.milligan@nrc.gov, ricardo.reyes@dtra.mil, veal lee <veal.lee@epa.gov>, stephen.domotor@eh.doe.gov,

Vanessa.Quinn@dhs.gov, william.cunningham@nist.gov, Walker.Stuart@epa.gov, Helen Dawson/DC/USEPA/US@EPA, schumann.jean@epa.gov, Ferris.John@dol.gov, siddhanti@endyna.com, asa4@CDC.GOV, Jack.Patterson@usda.gov, tdkraus@sandia.gov, "Conklin, Craig" <craig.conklin@HQ.DHS.GOV>, "MacKinney, John A" <John.Mackinney@dhs.gov>, Samuel Hernandez/DC/USEPA/US@EPA, Wynne Miller/DC/USEPA/US@EPA, Darrell Liles/DC/USEPA/US@EPA, agee.thomas@epa.gov

Date: 09/29/2010 08:20 AM

Subject: PAGs Subcmte: Best time for a call?

PAGs Subcommittee,

We'd like to hold a PAGs Subcommittee conference call soon to discuss next steps on the PAGs Manual revision. We've conducted an intra-Agency review within EPA and are working on some language choices and you can help. Could you let me know which of the date/times below you can NOT make by noon Friday, so I can get an invitation and agenda out by Friday afternoon? Thanks for letting me know if you have any concerns or questions, and I look forward to talking with you soon!

Which of these times do NOT work for you?
Wed. Oct. 6, 10 - 11:30 am
Wed. Oct. 6, 12:30 - 2 pm
Thurs. Oct. 7, 9 - 10:30 am
Thurs. Oct. 7, 10:30 - 12 pm

Sara
Sara D. DeCair, Health Physicist
www.epa.gov/radiation/rert/pags.html
Center for Radiological Emergency Management
U.S. Environmental Protection Agency
office (202) 343-9713
fax (202) 343-2304
decair.sara@epa.gov

Thanks Colby ... we had not seen this yet.

Colby Stanton---06/18/2009 10:36:21 AM---Sara's out on leave today and tomorrow; I wanted to be sure you saw this. ----------

From: Colby Stanton/DC/USEPA/US

To: "David Huber" <Huber.David@epamail.epa.gov>, "Wynne Miller" <Miller.Wynne@epamail.epa.gov>, "Susan Stahle" <Stahle.Susan@epamail.epa.gov>

Cc: "Sara DeCair" <Decair.Sara@epamail.epa.gov>

Date: 06/18/2009 10:36 AM

Subject: Fw: Inside EPA Story

Ex. 6 - Personal Privacy I wanted to be sure you saw this.

Sent by EPA Wireless E-Mail Services
Jessica Wieder

----- Original Message -----
From: Jessica Wieder
Sent: 06/18/2009 10:05 AM EDT
To: Sara DeCair; Colby Stanton; Jonathan Edwards; Glenna Shields; Nate McMichael
Cc: Michael Kokoszka
Subject: Inside EPA Story

FYI - Of course he didn't use the part of our statement saying that the proposal hasn't been issued. The last paragraph is on the cancelled PEER meeting. - Jess

Inside EPA - 6/19/2009

- Adjust Text Size +

NUCLEAR GUIDE MAY REVIVE FAILED EFFORT TO RELAX WATER STANDARDS

EPA's use of a controversial method to calculate the drinking water protections in its draft nuclear emergency guide is prompting some activists to accuse agency officials of trying to use the document as a vehicle for reviving a decades-old proposal to relax the agency's drinking water standards that a federal court previously rejected.

The accusations come as activists are gearing up to pressure newly confirmed Obama appointees to the agency to abandon the nuclear emergency guide, and activists say their contention that the drinking water protections are at least in part based on the old proposal bolsters their argument against the controversial draft document.

Agency officials under the Bush administration calculated the drinking water protections in the draft *Revisions to the Protective Action Guides Manual for Radiological Incidents* using radiation dose conversion factors from EPA's *Federal Guidance Report 13* (FGR-13), which is based on models from a document known as International Commission on Radiological Protection (ICRP) Publication 60, an EPA spokeswoman recently told *Inside EPA*. The draft guide has been on hold pending further review since the Obama administration halted its publication in the *Federal Register* shortly after taking office in January.

Activists have been critical of the draft guide for suggesting that emergency responders need not consider providing people with alternative sources of drinking water until contamination in their regular water supply reaches levels thousands of times higher than what the agency allows for in its formal regulations. They say FGR-13 and ICRP Publication 60 use what is commonly known as the effective dose equivalent (EDE) method of calculating radiation exposure limits. EPA also used the EDE method in a 1991 proposal to relax its drinking water standards -- called maximum contaminant levels (MCLs) -- for radioactive substances. But the agency ultimately withdrew the proposal and reverted back to its previous calculation method after 1996 amendments to the Safe Drinking Water Act (SDWA) made relaxing MCLs illegal, the activists note.

Major industry groups, including the Nuclear Energy Institute and the National Mining Association, filed lawsuits challenging EPA's assertion that it could not relax the MCLs in light of the SDWA amendments, arguing in part that the agency's decision ignored the "best available science" and that the agency did not properly evaluate the costs and benefits of its decision.

But the U.S. Court of Appeals for the District of Columbia Circuit upheld the agency's decision in a 2003 ruling. The "anti-backsliding provision" of the SDWA amendments "would still prevent the agency from raising the MCLs" even if the "best available science" or a cost-benefit analysis suggested otherwise, the court ruled. *Relevant documents are available on InsideEPA.com.*

Activists are now accusing officials in EPA's Office of Radiation & Indoor Air (ORIA) of using the new nuclear emergency guide as a vehicle for reviving the unsuccessful 1991 proposal to use the EDE method to relax drinking water standards.

While the agency has been blocked from using the method to relax its enforceable MCL regulations, the non-binding nuclear emergency guide provides ORIA officials with a vehicle to revive the 1991 proposal and "sneak it through the back door," one activist says.

An EPA spokeswoman in a June 11 statement to *Inside EPA* maintains, however, that the

nuclear emergency guide "in no way impact[s] or affect[s] regulatory drinking water standards, which exist to protect public health on a day-to-day basis." The emergency guide is "used as guidance during immediate response to radiological emergencies," the spokeswoman says.

EPA officials have defended the nuclear emergency guide similarly in the past, arguing that the drinking water protections in the document address the relatively short-term radiological exposure anticipated after a nuclear emergency. In contrast, the more stringent MCLs are based on a lifetime of exposure, agency officials have argued.

But activists remain dissatisfied with the amount of information EPA is providing about the calculations and are vowing to pressure recently confirmed Obama appointees to abandon the nuclear emergency guide. The activists' contention that ORIA officials are using the document as means of reviving the 1991 EDE proposal bolsters their arguments against the document, one activist says.

The activist group Public Employees for Environmental Responsibility (PEER) recently canceled a planned meeting with ORIA officials in protest after PEER officials complained ORIA staff did not provide them with all the background information on the nuclear emergency guide that activists had hoped to discuss during the meeting, which had been scheduled for May 26. -- *Douglas P. Guarino*

INSIDEEPA-30-24-17

Subject: Fw: Web conference invitation : IND Planning Guide and Alternate PAGs paper from FRMAC
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA
Cc:
From: CN=Jeffrey Blizzard/OU=DC/O=USEPA/C=US
Submit Time: 3/3/2010 10:09:29

Subject: Fw: EPA Protective Action Guides
To: CN=Sara DeCair/OU=DC/O=USEPA/C=US@EPA CN=Darrell Liles/OU=DC/O=USEPA/C=US@EPA
Cc: CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA
From: CN=Alan Perrin/OU=DC/O=USEPA/C=US
Submit Time: 9/2/2010 10:05:22

FYI
~~~~~~~~~~~~~~~~~~~~

----- Forwarded by Alan Perrin/DC/USEPA/US on 09/02/2010 10:04 AM -----

From: "Fisher-Tyler Frieda (DHSS)" <Frieda.Fisher-Tyler@state.de.us>

To: Alan Perrin/DC/USEPA/US@EPA

Cc: Lee Veal/DC/USEPA/US@EPA, 'Ruth McBurney' <rmcburney@crcpd.org>

Date: 09/02/2010 10:00 AM

Subject: RE: EPA Protective Action Guides

Good Morning, Alan.

I am awaiting a call back from Jeff Bean. Thanks for the invitation for CRCPD to participate on this important matter.

Regards,

Frieda Fisher-Tyler, MHS, CIH
Member at Large, CRCPD Board of Directors
Homeland Security/Emergency Response Council Chair

NRC State Liaison Officer, Delaware
Administrator, Office of Radiation Control
417 Federal Street
Dover, DE 19901

(302) 744-4546
(302) 739-3839, fax
* Think Green - Not every email needs to be printed.

-----Original Message-----
From: Perrin.Alan@epamail.epa.gov [mailto:Perrin.Alan@epamail.epa.gov]
Sent: Monday, August 30, 2010 11:47 AM
To: Fisher-Tyler Frieda (DHSS)
Cc: Veal.Lee@epamail.epa.gov
Subject: EPA Protective Action Guides

Dear Ms. Fisher-Tyler,
~~~~~~~~~~~~~~~~~~~~

I am writing to invite you to help the EPA's Radiation Protection Division improve the Protective Action Guides (PAGs) Manual. The PAGs Manual provides emergency planners at the Federal, State, and local levels with guidance on protecting the public during a radiological incident.

The Radiation Protection Division has engaged EPA's Conflict Prevention and Resolution Center to identify ways we can work with stakeholders as we improve the PAGs Manual. We have engaged two neutral, third-party facilitators, Martha Bean of Collaborative Focus (www.collaborativefocus.com) and Jeff Bean of Beyond the Courthouse (www.beyondthecourthouse.com), to advise us.

As a first step, Jeff and Martha are scheduling conversations with key stakeholders. When they contact you, I'd be grateful if you would schedule time to talk with them. Your conversations will be confidential, so you can freely share your opinions, ideas and perspectives on the issues. Martha and Jeff will provide us with themes from the interviews. Based on these themes and their long expertise in the field of collaborative policy development, they will offer recommendations and options for how we might proceed.

If you have any questions, please contact Lee Veal of my staff at (202) 343-9448.

Sincerely,
Alan Perrin
~~~~~~~~~~~~~~~~~~~
Deputy Director, Radiation Protection Division
Office of Radiation and Indoor Air, USEPA
office: (202) 343-9775
mobile: (202) 279-0376
perrin.alan@epa.gov
~~~~~~~~~~~~~~~~~~~

Subject: Fw: Next Steps on PAGs
From: CN=Jonathan Edwards/OU=DC/O=USEPA/C=US
Submit Time: 5/11/2010 08:38:33
To: CN=Alan Perrin/OU=DC/O=USEPA/C=US@EPA CN=Lee Veal/OU=DC/O=USEPA/C=US@EPA "Sara DeCair" <DeCair.Sara@epamail.epa.gov>

FYI

Sent from my BlackBerry Wireless Handheld (www.BlackBerry.net)
Mike Flynn

----- Original Message -----
From: Mike Flynn
Sent: 05/11/2010 08:35 AM EDT
To: Jonathan Edwards; Alan Perrin
Cc: Andrea Cherepy
Subject: Fw: Next Steps on PAGs
Jon/Alan, let's try to get a mtg on the calendar next week to firm up next steps so everyone is on same page (mtg probably should be over in ARN). In meantime, I'm working the OD/DOD's individually.
to ----------\Sent by EPA Wireless E-Mail Services.
Mike Flynn

----- Original Message -----
From: Mike Flynn
Sent: 05/10/2010 06:32 PM EDT
To: Dana Tulis; Barnes Johnson; Elizabeth Southerland; Cynthia Dougherty; Pamela Barr; Mary-Kay Lynch; Richard Ossias
Cc: Jonathan Edwards; Alan Perrin; Susan Stahle; Sara DeCair; Lee Veal; Jean Schumann; Stuart Walker; Wynne Miller; David Huber
Subject: Next Steps on PAGs
I wanted let you know that Gina McCarthy passed on that she was able to talk to the Administrator concerning the Agency's policy direction on the PAGs Manual, and the Administrator agreed with our proposed approach (outlined below). I will be setting up a meeting shortly with you to discuss our process/approach to engaging our inter-agency partners. In the meantime, we will begin the process of updating the draft PAGs Manual and the draft Federal Register Notice of Availability for Public Comment to reflect the new approach.

Thanks for all your efforts on this. If you have any questions, please give me a call or contact Alan Perrin at 202.343.9775.

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395
----- Forwarded by Mike Flynn/DC/USEPA/US on 05/10/2010 05:59 PM -----

From: Alan Perrin/DC/USEPA/US

To: Dana Tulis/DC/USEPA/US@EPA, Barnes Johnson/DC/USEPA/US@EPA, Elizabeth Southerland/DC/USEPA/US@EPA, Cynthia Dougherty/DC/USEPA/US@EPA, Pamela Barr/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA

Cc: Jonathan Edwards/DC/USEPA/US@EPA, Mike Flynn/DC/USEPA/US@EPA, Jean Schumann/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Sara DeCair/DC/USEPA/US@EPA, Wynne Miller/DC/USEPA/US@EPA, David

Huber/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA

Date: 04/30/2010 03:31 PM

Subject: PAGs paper

Thank you for the comments you provided on the PAGs talking points for meeting with the Administrator. Your comments were used to produce the attached revision of the paper, and the revision has been forwarded to Gina McCarthy. -Alan

PAGs_draft_adp-v2.doc PAGs_draft_adp-v2.doc

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Alan Perrin

Deputy Director, Radiation Protection Division
Office of Radiation and Indoor Air, USEPA
1200 Pennsylvania Avenue, NW (6608J)
Washington, DC 20460

phone: (202) 343-9775
fax: (202) 343-2304
perrin.alan@epa.gov
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~